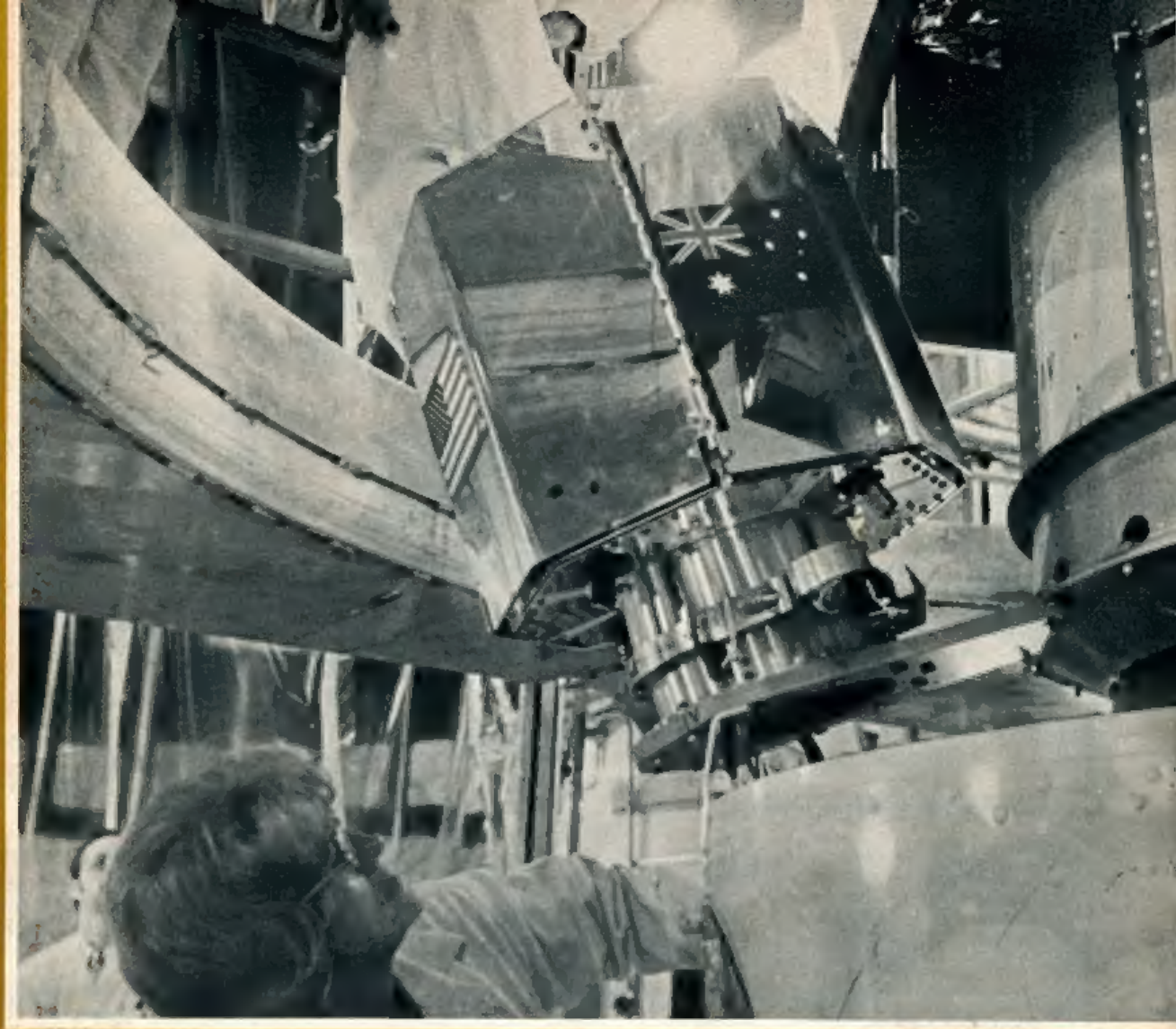
amateur radio



VOL. 43, No. 1 JANUARY 1975

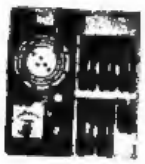
CONTENTS

COVER PHOTO

Dick Daniels WA4DGU on the upper level observes as Marie Marr, the Spacecraft Technician who actually assembled most of the spacecraft, makes some last adjustments to Oscar 7. The spacecraft was launched into orbit on Nov. 15th and is working well (see page 3).

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

GRID DIP METER
SPECIFICATION **Model TE-15**



Freq. Range: [illegible] in 6 Coils
A Coil 0.44—1.3MHz
B Coil 1.3—4.3MHz
C Coil 4.14MHz
D Coil 14.40MHz
F Coil 120-280MHz
Transistor: 3 TR's & 1 Diode
Meter: 500uA Fs.
Battery: 9V (BL-006P)
Dimensions: 180x80x40mm
Weight: 730g

Price $36.50
P & P $1.00

DELUXE AUDIO GENERATOR
SPECIFICATION **Model HE-22D**
Model TE-22D

Freq. Range: Sin: 20Hz-200kHz
Square: 20Hz-25kHz
Output Voltage: Sine: 7 volt.
Square 7 volt
Output Impedance: 1000 ohm
Freq. Accuracy +3% + 2Hz
Distortion: Les than 2%
Tube Complement: 6BM8
12 AT7, 6Z4
Power Source: 105-125, 220-240V AC, 50/60 cps. 19W
With Attenuation Range
4 Ranges—1/1, 1/10, 1/100, 1/1K

Compact-Space Saving
Printed Circuit for uniform Characteristics.
Low Distortion
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Most popular D style for 2 m FM channels 1, 4, B, 50 etc.	$6.50
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Selsyn motors, 50 volt, new	$5.00
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Rocking armature mic. Insert	30c
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9 pin as above	98c
Polypak 100 mixed resistors ½W-2W all new	$1.90
Polypak 30 assorted capacitors, ceramic, electrolytic polyester, all new	$1.50
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Switches, 4 position, 2 pole	$1.00
8 transistor radio cricuit board with all components and battery holder ready to go straight from production line	$3.00
6 transistor, as above	$2.00

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GENERAL COVERAGE

5 BANDS 150-400 kHz, 550-1600 kHz (Broadcast band), 1.6-4.8 MHz, 4.8-14.6 MHz, 10.5-30 MHz. **Operates from 12 Volts DC (negative ground) or 220-240 Volts 50 Hz.**

- Field Effect Transistors in RF Mixer and Oscillator Stages.
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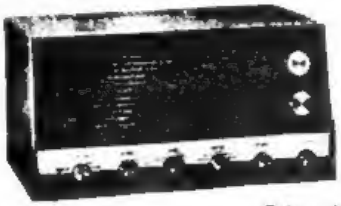

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This is an all solid state, wideband RF Signal Generator which produces low impedance low distortion RF signals. It is highly dependable and easy to operate, and is a handy working instrument for service benches and electronic equipment production centres.

SPECIAL FEATURES

1. Generates wide range signals from 100kHz to 30MHz in six frequency ranges.
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3. Includes 400Hz signal source for modulation of output signal, which can be modulated by external sources.

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Headphones, low impedance, ex-Army in sealed box, pair	$2.00
Tag strips, 7 lug plus 2 mounting lugs 10 for	50c
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20 amp DC meter in wooden carrying case	$10.00
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No. 19 and 62 transceivers, partly wrecked, any reasonable offer accepted.	

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SPECIAL FEATURES

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6BA6-6AK5-6V6G-6J6	$1.00
2E26-QQE04/7-QQE04/10	
6SK7-ECH35-6K8G-5763	$3.00
6SJ7GT-12AT7	$1.50

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amateur radio

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QSP

OSCAR 7 LAUNCHED

David Hull VK3ZDH
Project Australia

After a couple of delays Oscar 7 was launched from the western test range in California at 1711 GMT on Nov. 15, 1974.

To cover the launch two international telephone circuits and a number of HF radio links were employed including an 80m net for within VK traffic. The spacecraft station conference telephone circuit linked VK3ZDH in Australia and VE3QB and VE2BYG in Canada with Perry Klein K3JTE and Jan King W3GEY at the Goddard Spaceflight Centre in Maryland. The Net telephone conference circuit linked W3ZM, the AMSAT Net control station, W1AW, the ARRL Net station, WA3NAN, the club station at the Goddard Spaceflight centre, W6AB, the club station at the western test range and WA4DGU at the Goddard Spaceflight centre. A number of W stations transmitted the launch proceedings on the 15, 20, 40 and 75 metre bands.

At 1711 GMT the voice of Dick Daniels WA4DGU echoed around the world "5, 4, 3, 2, 1, 0 . . . we have lift off" in the approved space age manner and the Delta rocket carrying Oscar 7, the Itos G weather satellite and the Spanish research satellite INTASAT, lifted off the launch pad and into Amateur Radio history.

The spacecraft was initialised with the 435.1 MHz beacon on FSK CW mode and signals at very high signal levels were heard in VK on the initial orbits. The CW was decoded and telemetry frames, showing all values as nominal, reported back to AMSAT. On later orbits the Australis RTTY telemetry was switched to the 435.1 MHz beacon and also performed as designed. Initial orbits with the translators switched on showed that many VK and ZLs were ready and many contacts were made. The power levels required to work through the 70 cm to 2m translator were much lower than AMSAT had predicted which is encouraging to VKs on lower power limits. Codestore messages were loaded from VK3ZDH for the first time on Orbit 172.

Thus the second long life Amateur satellite was born, and for the first time Radio amateurs have two operational satellites at once. **Amateur Radio is in space to stay.**

AMSAT-OSCAR 7 during vibration tests. The 2304 MHz quadrifilar antenna furnished by RCA and 10 metre deployable antenna from Ametak Hunter Spring are on the top.

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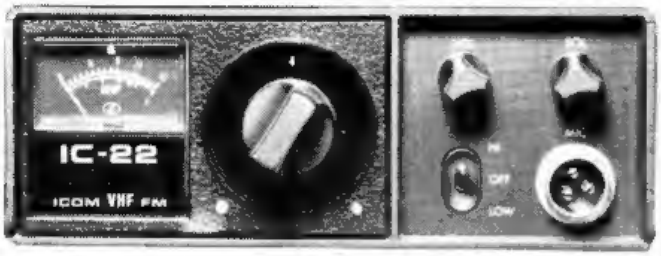

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S.A.	FARMERS RADIO PTY. LTD. 257 Angas Street, Adelaide, 5000.	Ph. 23 1268
W.A.	H. P. PRIDE, 26 Lockhart Street, Comm. 6152	Ph. 60 4379

QSP

IARU REGION 3

The IARU R3 Association Conference is due to be held **4th to 13th March 1975.** The Conference will be held in **THE LEE GARDENS HOTEL,** Hysan Avenue, Hong Kong.

A special IARU discounted rate at this hotel has been secured and applies as long as at least 20 people stay there. At this stage there are still a few vacancies so if any amateur with or without family wants a holiday why not consider taking it at this time to take advantage of discounted accommodation. You do not have to join in any of the amateur functions and you could spend all your time sight-seeing.

If you are likely to be in Hong Kong around that time why not write direct to Rudi Gmelin, VS6AX, c/- Jebsen & Co. Ltd., P.O. Box 97, Hong Kong, for more details and say you wish to support Region 3.

Readers will be well aware of the aims and objects of the IARU and the enormous value of this organisation to amateur radio on the international scene. Everyone ought to know also how the IARU delegation at the 1971 Space Conference worked wonders for the cause under some very adverse conditions. This followed in the footsteps of the very able IARU representation at the ITU's W.A.R.C. in Geneva in 1959.

In the earlier 1959 WARC the local amateur representation was sponsored and paid for by the WIA and the delegate was accredited as a member of the official Australian delegation. The IARU was represented by various Region 1 delegates. In the 1971 WARC the status of the IARU had improved and the IARU team included prominent amateurs from each of the three IARU regions. The delegate from Region 3 was in fact supported and financed by the IARU Region 3 organisation.

Why was it necessary to have a regional IARU body at all? This is very simply answered by saying that the IARU is our 'trade union' — "united we stand, divided we fall" and all that. Not only does a united body such as the IARU carry weight but it also serves to spread the financial and administrative loads much more evenly.

The 1959 W.A.R.C. cost the WIA a lot of money. The 1971 W.A.R.C. cost to the WIA was part of the Institute's subscription to the IARU Region 3 Association.

For ITU purposes the world is divided into three Regions: Region 1 being broadly Europe and Africa, Region 2 the Americas and Region 3 the rest of the world. If, as did actually occur, IARU regional organisations sprang up in Regions 1 and 2, the amateurs in Region 3 had to get together or remain out on a limb. Hence the birth in Sydney of the IARU Region 3 Association sponsored heavily by the three largest of the region's amateur societies in 1968/69.

The first formal conference of the Region 3 Association was held in Tokyo on the invitation of JARL from 17th to 22nd March 1971 and was occupied mainly with constitutional and procedural matters although some thought was given to the 1971 WARC and the need for more spectrum space for the amateur service.

The composition of the Region 3 Association is that the Conferences (every 3rd or 4th year) are the supreme authority of the Association and each member society is entitled to appoint one delegate who shall have one vote provided the society he represents is financial.

The day-to-day management of the affairs of the Association are carried out by four Directors acting in accordance with Conference directives and regulations and answerable to the Conference. The Directors and the Secretary have no vote but can of course speak at a Conference.

WIA DELEGATE

The 1974 WIA Federal Convention appointed Dr. David Wardlaw, the Federal President, to be the WIA delegate at the Hong Kong R3 Conference. It is believed that the other delegates to the Conference could be VS6DD or VS6FU or VS6AX of HARTS (the Hong Kong 'host' Society), ZL2IY or ZL2AMJ of NZART (the Kiwis), 9VIQG of SARTS (Singapore) and W1RU of ARRL. There are at present 9 member societies of the R3 Association — ARRL, ARSI (India), JARL (Japan), HARTS, NZART, PARA (Philippines), SARTS, RSSL (Sri Lanka), and WIA. As each Society has to defray all the costs of its own delegate(s) to attend the Conference it can be seen that this could bear heavily on the smaller societies but there is provision for proxy voting.

R3 DIRECTORS

The Region 3 organisation itself has to pay the costs of the Directors attending each conference as well as the Secretary. The Secretary is no less a person than our own David Rankin VK3QV/9VIRH and the present Directors serving through to 14th March 1975 are Michael Owen VK3KI, Kan Mizoguchi JA1BK, Tom Clarkson ZL2AZ and Bob Denniston W0DX. As all these people have to be flown to Hong Kong and return (which, in the case of W0DX is believed to be the Caribbean area) it can be seen that the transportation expenses will be considerable unless some of them can fit in a business trip to pay for most of their expenses.

R3 SUBSCRIPTIONS

The R3 Association must have access to funds and this is done through an annual subscription payable by each member Society. The annual dues are on a sliding scale beginning with 15 USA cents per transmitting member up to 5000 subject to a minimum sub. of $US25. The association's financial year ends on 31st May each year and as the dues are specified in U.S. currency a wide variation is likely to occur from year to year by reason of differences in exchange rates. The WIA in turn set aside a small amount (20 cents up to 1974 and 30 cents from 1975) from each member's subscription so as to form a fund not only to pay the Institute's dues to the Region 3 Association but also towards the costs of sending a delegate or delegates to R3 conferences.

THE 1975 CONFERENCE

No agenda has come to hand as yet for the 1975 Conference and it is not known what proposals are likely to be put forward except that the WIA are working on a VHF memorandum relative to Region 3 so that member societies may have some material to convey to their own administrations in the event of amateur VHF frequencies becoming diverted to other services as is already beginning to occur. IARUMS would certainly be another item under discussion. Basically, however, the various divisions of the WIA appear to have nothing to contribute or, if they have, nothing has been submitted.

One of the most important items which the Conference may elect to discuss in great depth is of course the impending 1979 WARC. This is because the 1975 R3 Conference could well be the last one which can be held before administrations crystallise their attitudes in advance. A R3 Conference in 1978 is likely to be much too late to have any effect on the 1979 attitudes of administrations.

It is not unlikely that the virus which affects amateurs as exemplified by their apparent inability to communicate amongst themselves is also a disease which spills over to the wider arena of Region 3. Very little has come out of the Region since 1971 but this is not due to any lack of thought by many who are involved. Perhaps the establishment of a regular column in AR may stimulate interest in this field not only by WIA members but by some of those in distant countries of the Region who receive this journal. If this can be the forum for Region 3 affairs at least something might be achieved which did not exist before.

The Executive.

QSP

QSL INFORMATION FROM KEN VK3AH

CR8AC — P.O. 59, Dili, Portuguese Timor.
8Q8AC — Oper. 4S7YL, 6 Quebec St., Marleigh, Rep. Maldive Isles.
8P6FU — C/- L.I.A.T. Airways, Barbados.
9Y4CR — Box 1036, Trinidad.
OA4BV — Box 538, Lima, Peru.
SV0WGL — QSL Mgr., K4EKJ.
FK8SB — QSL via DJ9ZB.
9Y4VV — QSL K9KXA.
FR7AK — Bert (can anyone supply this one?).
ET3USE — P.O. Box 191, Asmirrah.
ZM7AH — QSL via W5ZF, 11504 Golden Gate St., New Mexico, 87111.
S21JA — QSL via JA2KLT.

INTERFERENCE PROBLEMS

Radio Communication journal of the RSGB carries a box inviting members accused of causing interference or who suffer interference from external sources, to seek the assistance of RSGB Interference Committee in solving their problems. It would certainly be useful if the WIA Divisions had such Committees or access to a Central Committee.

RECIPROCAL LICENSING — UK

According to Radio Communications, Sept. '74, applications for reciprocal G licences should be sent to the Home Office, Radio Regulatory Division, Waterloo Bridge House, Waterloo Road, London SE1 8UA, England. Visitors who propose to take into the UK equipment capable of transmissions between 26.1 and 29.7 MHz must first obtain written authority from the Secretary of State, Home Dept.

TVI

Pat Hawker, writing in TT Radio Comms, Sept. '74, comments that there is plenty of evidence that UHF TV has brought far less relief to the amateur scene than expected, due largely to TV Rx design with susceptibility to pick-up on the outer braid of the aerial and extremely limited dynamic range. He adds that the forecasted improvement that UHF would bring appears to be cancelled out by transistor tuners and the lack of front end filtering.

MC103 MIXER

Spectrum International of the USA draws attention to the availability from them of an equivalent mixer weight 1½ oz. price $US8.50. This mixer was the one included in the SL600 Series SSB transceiver article on page 8 of August '74 AR in which SI's advertisement appeared on p.24.

AARTG

The new Secretary of the AARTG is Fred Hull, VK6FH, c/o Royal Flying Doctor Service of Australia, 187 Roberts Rd., Subiaco, WA 6008. The new Chairman is Don Graham VK6HK. In a circular, the Group say it will not be possible to continue publishing "Keybaud" for the time being and that affiliation with the VK6 Division should be sought. Interstate members are encouraged to form local groups to affiliate with local Divisions, but if this is not possible, individuals would still be welcomed as a present AARTG member.

LICENCE FEE INCREASE

As may have been expected, there was a very satisfactory response to the suggestion that members of Parliament be lobbied about the increase to $12 p.a. of the licence fee. In a letter dated 29th October, the PMG rejected the Institute's submissions mainly on the grounds that the Government could not continue to subsidise the administration of amateur radio stations to the extent that it had done over recent years. The parts played by amateurs in providing emergency communications and the study of the radio art as well as being a leisure time activity were all noted and praised but the new fee sticks.

SELF-HELP

"And I would then urge that they (the members) remember the fact that office-bearers of a voluntary organisation do NOT exist to serve the members; they exist to co-ordinate the efforts of the members in helping one another. I believe that the members and the Committee alike have forgotten this simple fact." John Martin in an editorial in the Sept./Dec. '74 issue of 'The Radio Bulletin' of the E. & M. Dist. Radio Club. (You can say that again—Ed.) ●

QUICK QUIZ

Submitted by:
IAIN MORRISON, VK4ZIG
33 Soule St., Hermit Park, Qld. 4812

In the past 6 months:—

1. Have you built or modified any of your gear?
2. Have you experimented on any of your gear?
3. Have you gainfully educated or instructed anybody on some aspect of A.R.?
4. Have you learnt anything **new** about A.R.?
5. Have you used most of your test gear?
6. Do you attempt to repair all your gear, if faulty?
7. Is your gear state of the art?
8. Is your test gear state of the art?
9. Do you attend your local Radio Club meetings? socials?
10. How many hours average per week do you devote to any aspect of A.R.?

ANSWERS:

Q 1.-9. — If you scored "No" — **why?**
Q 10. — Of course, the number of hours will vary from week to week, but did the question set you thinking?

This test was to stir up the silent amateurs, with a lot of **"No"** answers and **"No"** hours. For these I refer to the Handbook definitions — "Amateur Service", or Wireless Telegraphy regulations par. 55 (Page 36 of Sept. 1967 Revised Handbook). ●

Improved AM with the FT200

GEORGE FRANCIS, VK3ASV
31 Donald Street, Morwell, 3840

This article describes an attractive solution to the problem many VHF operators have experienced with their FT200 — how to receive AM signals as well as their old RX did.

Many VHFers and limited licencees are now using 6 and 2 metre converters, and transverters with the very popular Yaesu FT200 transceiver.

Excellent 2 m SSB operation is achieved, but for AM signals, especially ones that are poorly modulated or weak in signal strength, reception is poor. Little difference is noticed if the transceiver function switch is in the SSB or AM mode positions. To make matters worse, there are still many VHF AM transmitters in use using 8 MHz Command Transmitters, or similar, as a VFO multplied up. These are quite acceptable on a wide-band AM receiver, but are unreadable on a modern SSB transceiver having only a narrow band filter fitted, such as in the FT200 — (1). Any hum, VFO or even Xtal warm-up drift, frequency warble or FM-ing shows up markedly, making these AM signals almost unreadable with the BFO switched in. In the AM position these signals suffer from loss of audio and very bassy response.

This is of course caused by the 9 MHz SSB crystal filter cutting all the highs above approximately 1250 Hz. That is, an audio response of 300-2700 Hz divided by two; remember in AM there are two sidebands.

RTTY readers appreciate this problem on HF when trying to use the FT200, as this same filter attenuates the 2975 Hertz (space) audio tone in wide shift (850 Hz). Either you design your FSK converter using another set of audio tones such as 1575 and 2425 Hz, and still maintaining the 850 Hz separation, or change the transceiver upper or lower sideband crystal(s) — (2) to increase the audio frequency response to cover the two standard tones, i.e. 2125 and 2975 Hz. By moving the carrier crystal frequencies further away from the centre frequency of the 9000 kHz SSB filter, then the lower audio frequencies would be attenuated, and the higher frequencies covering the 2975 Hz tone would **not** be attenuated. However, this is not so easy — (3) and is unsuitable for SSB reception as the pitch is too high. It is also no help in receiving AM signals.

To overcome the above problem with the FT200 is a simple matter. It can be made compatible to both SSB and AM. As you may have guessed, why not add a 9 MHz filter with the desired band width to receive AM signals so that it can be switched in in lieu of the sideband filter.

Initially, a simple LC filter was made up, but at this high IF frequency, it was difficult to get any sort of selectivity. Unless you want to hear the strong stations on the band all at once, this is not recommended. To overcome this deficiency, a filter would have to be used with 5 to 10 kHz selectivity. After many letters, it was discovered that except for some VHF FM transceivers, only crystal lattice filters are used at this frequency.

Two of the local manufacturers were contacted; one firm stated they do not make filters up to special orders and so could not help me, and the other placed a $90.00 tag on such an order! Looking through overseas ham magazines showed such a filter was readily available — (4). I chose a KVG filter, type XF-9D — (5) having a 5 kHz bandwidth 6 dB down and a shape factor of 1.8, which promised to do the trick nicely. Ordered from the USA, it took only thirteen days to arrive at a very reasonable — (6) cost. The filter is 1-7/16" wide and ¾" high. Incidentally, the KVG firm of Europe also offer other models suitable for home constructors in the 9 and 10.7 MHz intermediate frequency ranges, covering bandwidths designed especially for CW, SSB, narrow or wide AM and FM modes.

This miniaturised filter is of similar dimensions to the existing Yaesu sideband filter. The KVG filter is mounted under the chassis against the printed board beneath the sideband filter. It is supported and mounted on a small braket made of sheet tin or brass plate. This bracket also acts as a shield and is soldered or bolted in place.

To carry out this modification when you have the filter and relays on hand, the chassis is removed from the cabinet as per transceiver instruction manual and placed on the bench upside down. **Remember to switch the power point (GPO) off and remove the power cable and power supply cable from the FT200,** and to place the five bottom screws aside where the, can be found again.

Fig. 1 shows the construction details of the bracket. The bracket is then fitted, and the filter bolted on using the filter mounting studs (3 mm nuts). It is mounted sideways so the input and output terminals line up adjacent to the connections of the sideband filter coming through the printed board.

So that the filter can be switched in and out of circuit, two sub-miniature relays are used. These are specials, and are approximately the size of a "K" style crystal can. These can be obtained in Melbourne — (8) or your Japanese ham friend in Japan. They are the same relays as supplied with the FTDX400 CW crystal filter kits — (9). Switching diodes could be used as is done in the FT101 series. These sub-miniature relays have the contact wiring connections printed on the outside of the relay and can be soldered directly in supported by the wires if short-

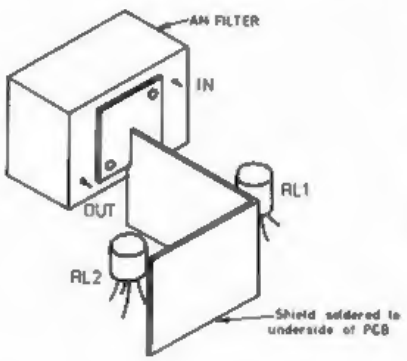


FIG. 1 [a] FILTER MOUNTING & SHIELD LAYOUT

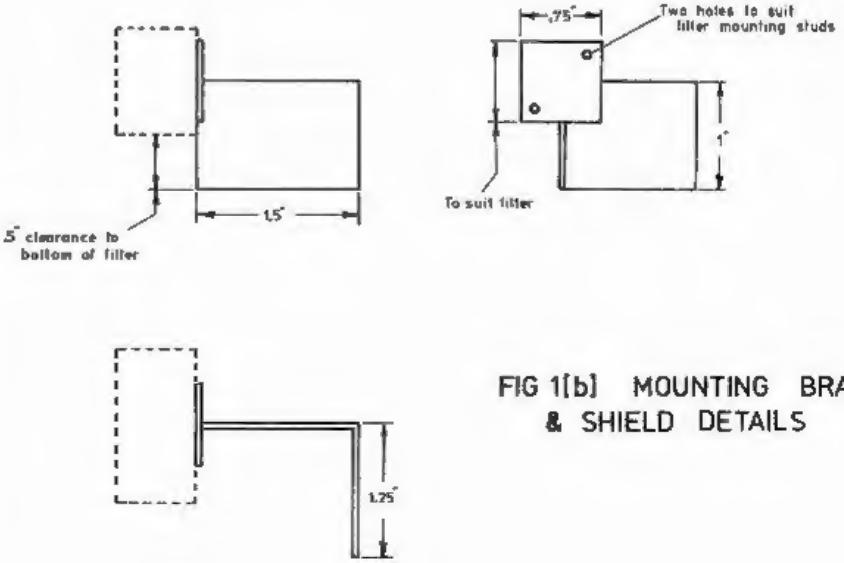


FIG 1[b] MOUNTING BRACKET & SHIELD DETAILS

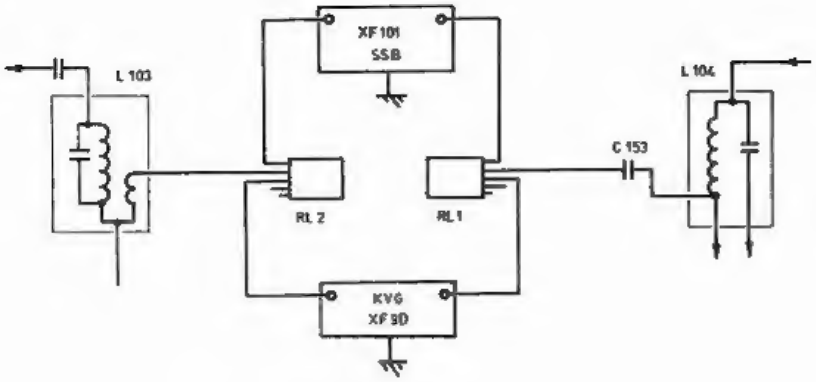


FIG. 2 RF WIRING

ened. I soldered them to the two filters as shown in Fig. 2. The capacitor C153 has to be lifted and wired to the common contact to one relay, and the wire from L103 wired to the other relay common leg. Remember to separate the relays and wiring as far apart as possible.

Fig. 3 shows the RF wiring. When the relays are un-energised (normal resting position) the sideband filter is switched in; the AM filter is switched in when the relays are energised.

No alignment whatsoever is required to L103 or L104, otherwise the shaping of the sideband filter band pass would be tilted or altered. RF lead lengths to the relays are to be kept as short as possible. 1 mm PVC sleeving should be slipped over the fine relay pigtails before soldering in, thus insulating the wires from one another.

Now wire up the DC Solenoid wiring to the relays as per Fig. 3.

Both relays are by-passed to earth by disc ceramic capacitors. The relay windings RL1, RL2, each require 24 volts and are wired in series. It doesn't matter which direction, but should there be a red dot painted on the relay, keep this one positive going. One side of the relay group goes direct to the 150v HT rail, and is soldered directly on to pin 11 at the power plug via an 8.2k 2 watt resistor (or two 15k in parallel).

The other wire is run to the unused switch contact on the function switch S3h, when switched to the AM position. The wiper blade on this wafer is already earthed. Therefore the circuit energises both relays, and changes over filters when the function switch is in the AM position.

Try and maintain good isolation between the filter input and output connections to minimise leakage, otherwise you will be destroying the steep slopes of the sideband filter band pass curve. Now, re-check all relay wiring with a multimeter on the resistance scale, and if satisfied all is correct, replace the chassis into the cabinet, re-connect cables and plugs, and switch on with the function switch in the SSB mode position.

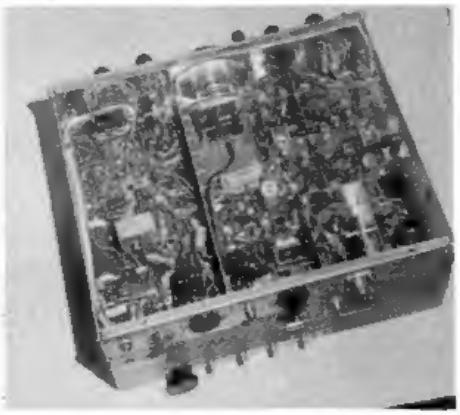
The FT200 should operate normally as before. Now tune in a 80 or 40 metre AM signal (which may prove to be the hardest task in the project, as AM HF signals are rare nowadays). Switch to the AM position, and the speech should sound clean and crisp, with some highs. If no luck hearing an AM amateur station, tune into a 41 metre international broadcast shortwave station above 7.1 MHz. It will be observed broadcasting stations will still suffer, as the high notes will still have some attenuation as these stations are 7 to 10 kHz wide.

As you tune across a steady strength 9 AM signal, the 'S' meter will show some filter ripple across the 5 kHz plateau, and the sides should be very sharp indeed.

This modification or addition will provide the user with a compatible receiver when used with a VHF 6 or 2 m converter or transverter, and many an old style of AM signal will still be enjoyed.

When you transmit now in the AM position, this wide band filter will allow two sidebands plus your re-inserted carrier to be transmitted. Tune up and operation on the AM mode is just the same as before.

So much for the AM operators, now what about the FSK boys. This addition also allows reception at the standard (wideband) — (12) RTTY tone frequencies, but to recover these tones the BFO is re-



The additional filter and relays can be seen beside the high wattage resistor on the left side of the FT200.

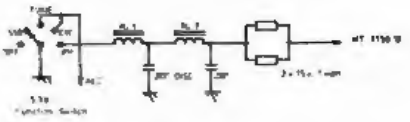


FIG. 3 RELAY WIRING

quired to be switched in, or in other words, when in the CW position, the wide band filter requires to be able to be switched in for FSK. This also is easily done by switching in a parallel set of spare contacts situated on the switch-pot VR1, with wafer switch Sh3. This switch pulls out for Noise Limiter which I find does not work properly. I suggest a noise blanker be wired in as kits are now available suitable for the FT200 — (8).

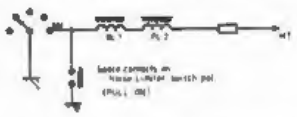


FIG. 4 USING THE 5kHz BANDWIDTH FILTER FOR WIDEBAND FSK

After the above NB wiring is added, the NL switch is spare and can be wired so that when the NL SW is pulled out, the 5 kHz filter is switched in. This makes it possible to copy the tones of a RTTY signal.

Incidentally, the FT200 is very readily modified to transmit FSK carrier by using the clarifier diode as the modulator (varicator) — (10). Of course two-tones (AFSK) can be fed directly into the microphone socket, but the success of this method depends on the efficiency of the filter.

A future article will show how to wire up an FT200 of the older model to use an FV200 External VFO. ●

NOTES AND REFERENCES

(1) FT200 9 MHz filter characteristics: Bandwidth 2.3 kHz at 6 dB down, 4 kHz at 60 dB down; Shape Factor 1.7.

(2) Change x 101 now 9001.5 to 9002.5
and x 102 now 8996.5 to 8997.5
Suitable relays could be fitted to change from SSB to FSK mode, but see article for better method.

(3) A later article to be written, will show how to add these two extra crystals in a FT200 for FSK reception using a standard RTTY converter. The trend is to use narrow shift on HF which is 170 Hz using a tone of 2295 kHz within range of the SSB filter.

(4) KVG made by Kristall-Verarbeitung Neckarbischofsheim GMBH West Germany.

(5) Attention: Mr. Henry Ingwersen, PAOAFN/WI, Spectrum International, P.O. Box 87, Topsfield, Massachusetts, U.S.A. 01983.

(6) Cost in 1970 was $32.45 U.S. plus 50 cents for bank clearance charge.

(7) See CQ, November 1970 "New Apparatus" — KVG Crystal lattice filters.

(8) Available on order from Ball Electronic Services, 60 Shannon St., Box Hill North, Vic. 3129.

(9) Sub-miniature relay, type SM24, 24 volt winding, Japanese manufacture may be available from Yaesu Agents, for $19.00 a pair.

(10) See "Amateur Radio" Page 11, September 1972 "Adding FSK to the FT200" by G. Francis VK3ASV (also reprinted in the ZL-FT200 club magazine edited by ZL1BBU).

(11) Radio Teletype Reception, by Eric Ferguson VK3KF, in "The Radio Bulletin", October 1973, Page 11.

(12) Hal RTTY Demodulator (2nd paragraph) Page 52. QST April 1973 and ASFK for RTTY, page 11 QST February 1969.

Bermuda: Key role in disaster net

ALAN SHAWSMITH, VK4SS

The Amateur Radio Caribbean Emergency Net claims to be as efficient as any Eastern USA Seaboard Emergency system. The Net is comprehensive and includes Florida, Mexico, West Indies, Bermuda, Yucatan, Honduras, Jamaica, Curacao, Grand Cayman etc., and covers several thousands of square miles of ocean.

Bermuda, particularly, plays a key role. The Island is just right 'skip' for optimum reception from all other areas. Every Net signal is 5 x 9 at the QTH of Ed. Kelly, VP9GE, who is Zone 1 Controller. Zone 1 also includes SE USA.

Besides their own up-to-date rigs, all Net members have a full kit of emergency gear, i.e. auxiliary power and antennas and can remain in action in the event of any crisis, such as tornado, earthquake, flood, disaster at sea, succour for injured or ill, etc. So well organised is the Caribbean Net that within seconds the whole system can be fully operational and ready to deal with any emergency.

One of the Net's most recent operations was during the Managua earthquake disaster when the Nicaraguan capital was almost destroyed, including its communication system. Rescue workers set up a radio station, and thereafter it was up to the Amateur operators who handled the calls for food, medical and other supplies, and set up a 'health and welfare' link to help people trying to trace relatives.

In April this year, the USA was hit by a series of tornadoes. Several Bermudians, away from home, were caught in the effected areas and had miraculous escapes from death. Stateside Hams in the worst hit areas set up emergency communications and Ed, VP9GE, was able to calm the fears of many, by relaying messages to relatives and friends on the Island.

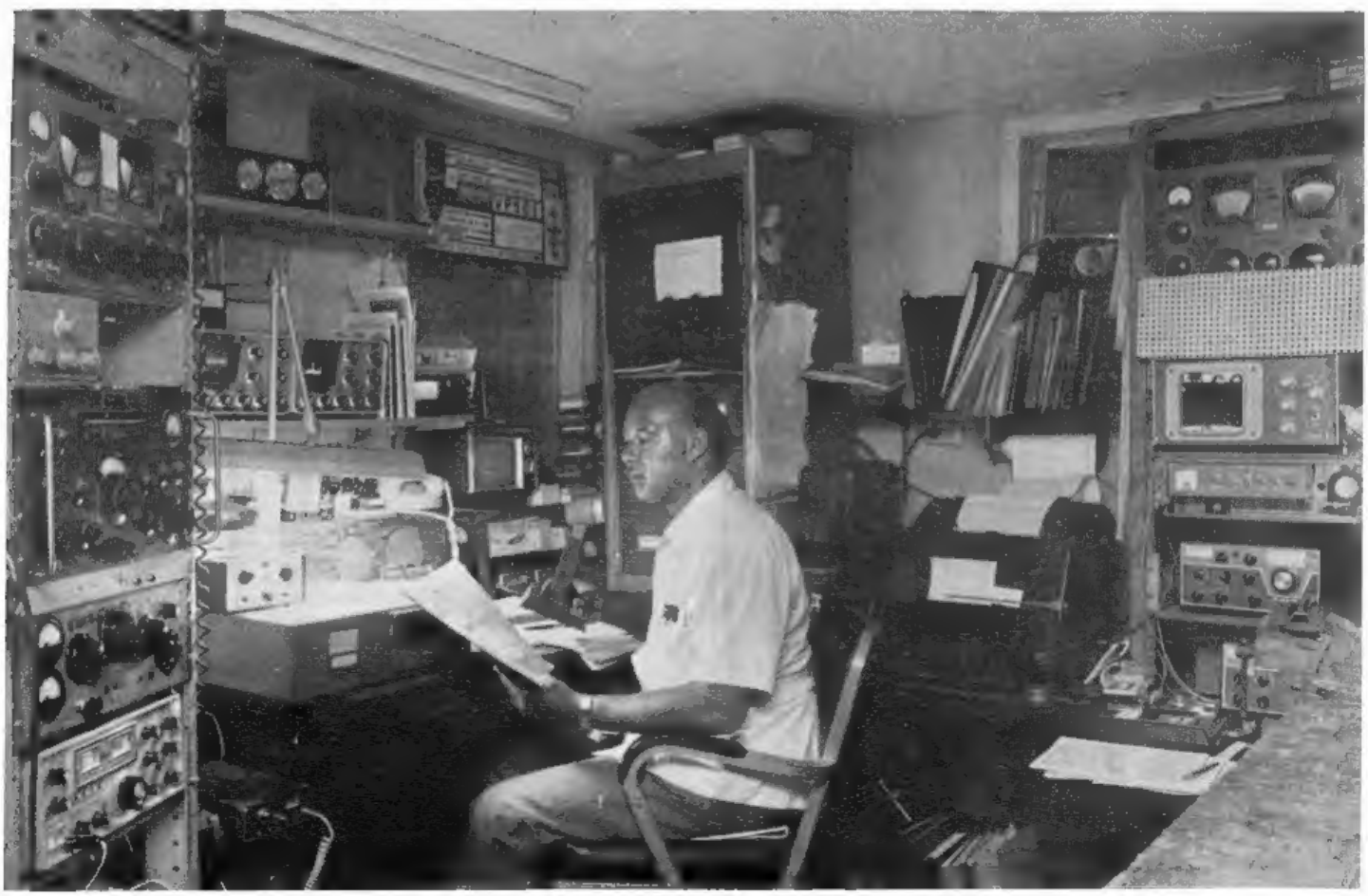
Ed Kelly's set-up is worth describing. The 'shack' is a brick building, specially designed and situated behind his house in the suburb of Pembroke. There are two towers with beams atop. He is QRV all bands from 160 — 2 mx. Inside the 'shack' is a maze of units: many of them are homebrew. He has RTTY and is the only VP9 set up for SSTV.

The Island is not short of Hams. The hobby is thriving under the activity of the Radio Society of Bermuda. Those who can stand in for Ed, VP9GE in Zone 1 in the Net, are Frank VP9GR, Jim VP9GY, Peter VP9GO and Roy VP9HM.

It is estimated that one in five of the Island's vehicles has 2 metre two-way radio, installed. Field sporting events such as rallies, powerboat racing and other out-of-the-line-of-sight activities are easily and adequately covered.

The AR Caribbean Emergency Net monitors the area twenty-four hours per day. Tuned ears and antennas provide an umbrella of watchfulness and assistance. In the event of a crisis in which any regular or commercial communication breaks down, or is overtaxed, the Net is ready to offer service. One of the many means of help that Hams can now provide on a global basis. ●

BELOW: Ed Kelly, VP9GE.



Radio Receiver R390A URR

PART 3

JOHN WEIR, VK3ZRV
221 St. Helena Road, Greensborough, 3088

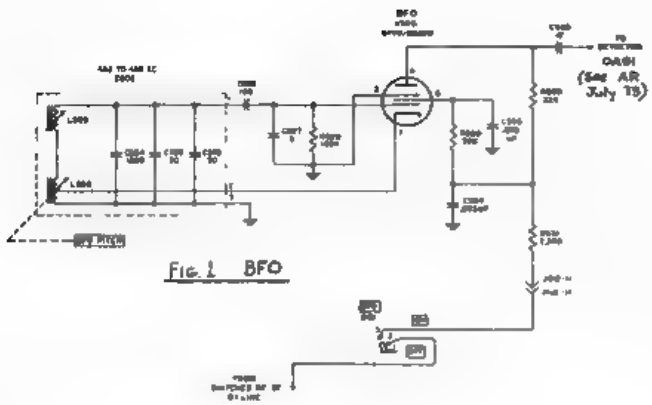


Fig. 1 BFO

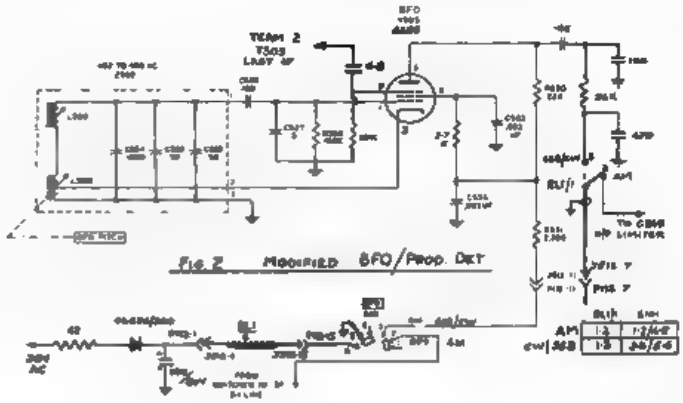


Fig. 2 Modified BFO/Prod. Det

Following on from the previous two articles, the series will now be concluded with the fitment of a product detector and a modified AGC system.

The first product detector circuit tried was the one described in AR Feb. 74, page 26, which used OA91 diodes, together with the refinement of shorting out one diode for AM detection. It seemed to work well but not completely to my satisfaction. Together with the added shielding and shielded wires necessary the whole thing became a bit unwieldy and so was discarded.

The second circuit tried was originally described by W3JHR in 'CQ' Jan. 68. This requires the replacing of the original BFO tube V505 (5749/6BA6W) with a 6BE6. Fig. 1 shows the original circuit for the BFO, while Fig. 2 shows the results of the modifications I have made using the 6BE6. Detailed instructions are unnecessary as I think the circuit is self-explanatory; however, there are a couple of points worth mentioning.

The BFO off-on switch has to be changed to a 2 pole 2 position switch. The relay is a small 24V sealed type salvaged from sources unknown (600 ohm coil resistance), while the 26V AC is derived from the hot side of the heater off-on switch on the rear of the receiver. When working around the socket of V505 make sure that the new components are clear of the bellows used to drive the tuneable inductor Z502. The circuit itself works extremely well and requires a minimum amount of fuss.

One problem did arise, however. I tried to feed the recovered audio from the product detector to the input of the noise limiter (via relay contacts) but found that the loss in audio was too great. Hence the decision to use the circuit shown.

AGC

The next part of the modification programme involved the AGC circuit which

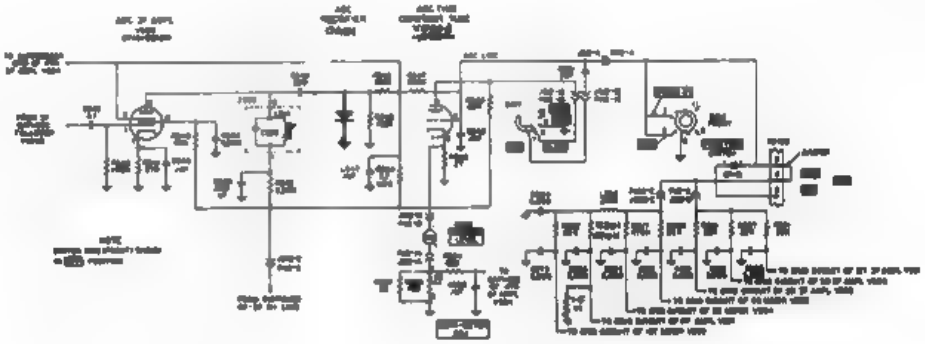


Fig. 3
AGC Ckt Diagram
(Modified As Per AR July 73)

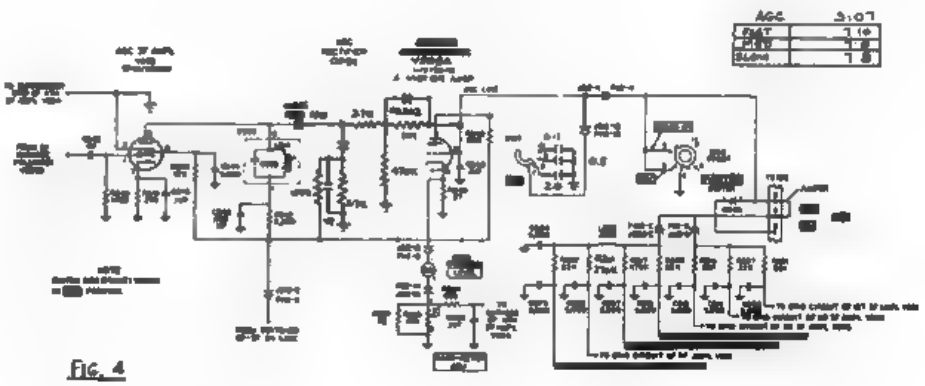


Fig. 4
AGC ckt Diagram
(Modified For SSB)

is shown unmodified in Fig. 3, while Fig. 5 shows the original schematic of the overall AGC distribution in the receiver. The main cause for concern with the original circuit was that the attack time seemed to be too long. The first couple of syllables after a pause tended to thump through before the AGC gave sufficient control of the audio level.

After experimenting with a number of circuits that one finally decided upon was an adaptation of that found in the FRDX400. The schematic is as shown in Fig. 4. When this was originally tried a small problem

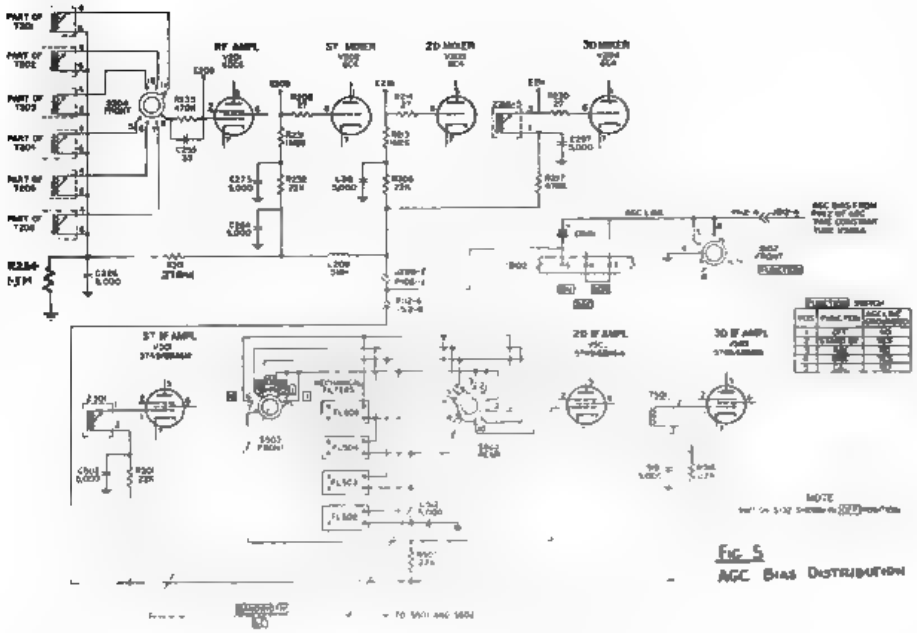


Fig. 5
AGC Bias Distribution

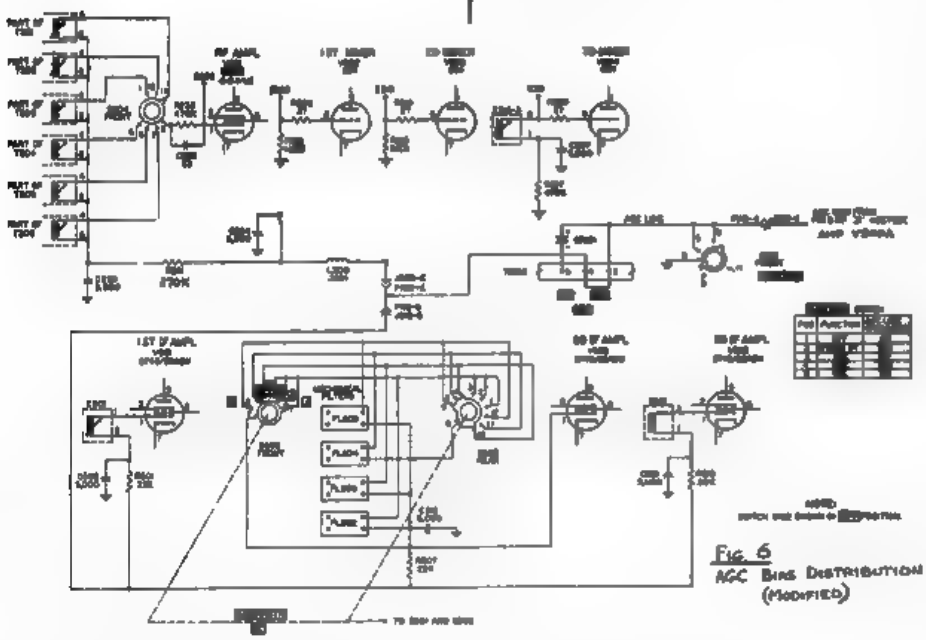


Fig. 6
AGC Bias Distribution (Modified)

was found in the action of the AGC time constant tube V509A (refer to AR July 73) Rewiring of the AGC switch S107 and the inclusion of two extra capacitors ended up giving a very effective AGC for SSB/CW with the choice of 3 time constants The voltage divider of 100K and 2.7K to the cathode of the AGC detector provides some measure of delay and so holds the AGC line down until the antenna signal level reaches about 3 microvolts.

When the new circuit is installed it is necessary to earth the suppressor grids of the AGC IF amplifier (V508 pin 2) and the fourth IF amplifier (V504 pin 2).

The final items necessary were some changes in the AGC feed to the controlled steges, RF (V201 6GM6), 1st mixer (V202 6C4), 2nd mixer (V203 6C4), 3rd mixer (V204 6C4), As previously mentioned, Fig. 5 shows the original AGC bias distribution while Fig. 6 shows the modified distribution.

The main points to note are the removal of R234 (1.5M) associated with V201 and the removal of AGC to the 1st, 2nd and 3rd mixers. With this change carried out I find I can run the RF gain flat out if necessary and still have no overload or distortion problems even on a 40 over S9 signal. Those who have these receivers in original condition will know that the setting of the RF gain control for reception of SSB signals is rather critical to say the least.

Conclusions

This now completes the series. However, to round things off, let me answer some of the queries I raised in my first article.

1. Is it possible to obtain better reception of SSB signals than can be obtained from the receiver in its original state?

   My answer to this one is yes. With the modifications as described carried out, I am much happier with the performance of the receiver.
2. Is it possible to build into the set an effective FM demodulator?

   My answer to this one is that all the circuits I have tried have left much to be desired. I believe that an outboard demodulator would be far more effective.
3. Is the noise limiter effective on AM and SSB?

   To this one I must answer yes and no; for AM it is very effective especially on 10 metres; for SSB however, as previously explained the answer is no. More experiments in this area are envisaged, for example, an IF noise blanker; but as this project is only in its infancy, I will make no further comments at this stage.
4. Is the AGC effective on SSB?

   In its original form, no, it is not, however modified as explained in this article the answer is yes, the receiver has a very effective AGC system for [illegible]

My thanks are extended to the numerous people with whom I have had informal discussions regarding this project, and whose ideas I may have begged, borrowed or stolen. Finally, my thanks to a very patient XYL without whose typing effort and endless prodding, the article might still be unfinished!

It all Started 40 years ago

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The four weekends in October, 1934, saw the staging of the WIA (Victorian Division) Centenary contest. This was the first time in history that any division or even the F.H.Q. of the WIA had staged such an enormous undertaking. I had the privilege of being appointed manager of the Centenary Contest Committee under the baton of Harry Kinnear (VK3KN), President of the Victorian Division at that time.

This contest was such a success that it saw the start of what is known today as the VK-ZL annual contest.

In making this report, I am referring to the initial publication of the contest and its rules as they appeared in "Amateur Radio" for the 1st March, 1934 and in QST for October, 1934.

The VK-ZL contest as it is known today, differs very little indeed to the original contest of 1934. However one point was allowed by each contacting station for every 1,000 miles between the capital cities of the States of the competing stations, measured by a great circle line. The Australian stations multiplied their score by the number of countries worked, and the stations outside VK by the number of Australian districts contacted.

It is interesting to note that the prizes offered were donated by Australian organisations such as Philips, A.W.A., and Siemens. These prizes consisted of transmitting valves, meters, etc. However, the main prize I think everybody treasured more than anything else, was a very excellent certificate commemorating the Centenary. A reproduction of this certificate appears in these notes and it should be noted that we were fortunate in obtaining a sketch of Batman in 1834 visualising the city of Melbourne.

The results of the contest were very interesting. In the Open Section, 1st place went to "Snow" Campbell (VK3MR) with 100,320 points, 2nd place to VK3GQ with 97,218 points, and 3rd place to VK3JQ with 56,666 points. VK3MR worked 38 countries, VK3GQ, 36 countries, and VK3JQ, 29 countries. In the Handicap Section, VK3HL won with 40,181 points with an input of 23 watts. Outstanding overseas station scores included G2ZQ with 3,850 points, J2GX with 3,414, PA0AZ with 4,908, VE5BI with 2,256, W6EXW with 7,854, closely followed by W9TB and W9FM and D4BAR with 5,400 points.

The complete results of this contest appear in "Amateur Radio" for the 1st March, 1935 and in QST for May and June, 1935.

It is of interest to note a very important point other than that of the contest itself. This period was the actual opening of the 10-metre band to international stations.

To recall the success of this contest, I would like to quote from a letter received from Horace Greer, W6TI, as follows:

> "On behalf of the Oakland Radio Club, I would like to take this opportunity of expressing our sincere congratulations and wishes for your October DX contest. We would like to go down on record in offering our complete co-operation in making your first contest of this nature most successful in every respect, and one to be long remembered in the hearts of loyal amateurs in all parts of the universe, to the best of our ability."

BELOW: A copy of the certificates awarded in this historic contest.

Soldering for Electronics

By Roy Hartkopf VK3AOH

Reprint from Zero Beat, December 1972

Every trade and profession has some implement which is associated with it. The gardener has his spade and rake, the carpenter his hammer and nails and the doctor his stethoscope. The basic tool for anyone who works in electronics is the soldering iron and until you can use it well you will never get much satisfaction from your work. There is no magic about using a soldering iron. Like any craft there are some tricks and bits of knowledge which only come with practice. However there are some fundamental requirements and in the first part of this article we will consider them.

CLEANING SURFACES

Solder is an alloy, a mixture of tin and lead, sometimes with small amounts of other elements. This alloy melts at a fairly low temperature and on the cleaned surfaces of some metals the molten solder will 'wet' the surface and penetrate a tiny amount into the structure making a bond which is as effective as if there were no joint but a continuous piece of metal. To get this result the first essential is that the surfaces should be completely free from contamination. Plumbers and sheet metal workers achieve this by using acid (this is called a flux) to etch the surface and remove all dirt and corrosion. In electronics work it is not possible to use this drastic method because the acid fumes and the acid left on the joint eventually corrode the components. So it is necessary to use a non-corrosive flux such as resin. This has the ability to dissolve some of the impurities which are on the surface although the surface must be fairly clean before this can happen.

When the metal to be soldered is tin the resin is very effective as the tin alloys with the tin in the solder and a perfect bond is formed. This is why most components and hookup wire are made with a tin coating over the copper conducting wire. An additional advantage of tin is that it does not corrode (that is, tarnish) in the atmosphere as much as many other metals do.

Circuit boards also often have their copper foil coated with tin, if they are not protected by a coating of resin. Occasionally you will find circuit boards, copper braids and so on without any protective coating at all. If this copper is clean and bright you will have little difficulty in soldering, but if the surface is dull and discoloured, it may well be impossible to make a good joint unless you scrape the surface thoroughly to remove the impurities. Sometimes disposal components which have been stored for a long time have corrosion even on the tin coated surfaces. Again the only remedy is to scrape the surface thoroughly until it is bright and shiny. This extra trouble is often worth the effort, because the manufacturers cannot afford the time and trouble involved in doing this, and often unload such components on the disposals market at very low prices.

CHOOSING SUITABLE SOLDER

The solder itself does not present many problems. As mentioned before, it must be used with a non-corrosive flux. The best way to get this is to use solder which is in the form of a hollow tube with the resin flux in the hollow centre. This is known as resin cored solder and is almost universally used in electronics work. Some manufacturers make solder which has not one but up to five separate cores so that the flux is distributed more evenly. Solder which has a large percentage of tin — about 60 per cent — is more expensive, but the extra cost is justified by the improved results. Some solders have a trace of copper in them and this is very effective in preventing the copper bit of the soldering iron from being eaten away.

Resin cored solders can be bought in different gauges, and the use of the correct gauge for the job not only makes a better soldered joint but makes the work easier and saves solder. For the soldering of valve type equipment and general heavy work 16SWG is quite satisfactory; for soldering integrated circuits on to circuit boards and other fine work a gauge as light as 22SWG can be used to advantage. Experimenting with different gauges will soon show you the best gauge for any particular job and it will pay in the long run to have two or three different gauges of solder handy.

CHOOSING THE CORRECT SOLDERING IRON

Probably the most important thing of all is to get the correct soldering iron. The electrically heated soldering iron is almost universally used nowadays, and there are many brands and types of soldering irons on the market. They range from those which are excellent to some which are so unsuitable that one wonders if the manufacturer ever used a soldering iron in his life! A fairly common mistake of some manufacturers is to try to make a general purpose tool. If you see an advertisement which tells you that a particular soldering iron is a universal tool and is suitable for the entire radio, electronics, telephone and hobbyist areas, **don't buy** it. It attempts to do everything, and you can be certain that it will do nothing really well.

There are several reasons for this. The purpose of a soldering iron is to store heat and apply it to the joint. The question is, **how much heat** is needed and **how hot** should it be? A small soldering iron is fine for small joints but it can only store a small amount of heat. If this iron is applied to a joint which contains a large amount of metal (for example, if you are trying to solder a thick wire to a metal chassis) there just is not the necessary **amount of heat** available to raise the temperature of the large volume of metal to a level where a satisfactory joint can be made. The manufacturers of these so-called universal soldering irons try to get over the problem by increasing the power which the iron uses. What they seem to overlook is that a small bit stores only a small amount of heat and also has a small surface area. When the iron is not in use and is resting on its stand, the air around it has only a slight cooling effect and the bit gets far too hot. This means that the solder on the bit, and the bit itself, oxidises (burns or corrodes), so that the bit must be constantly scraped and re-tinned. When the iron is used on light work, such as circuit boards, the heat is so great that small components and the adhesive bonding the copper foil to the board are burnt and ruined. Even if joints are made, the overheating causes them to be unreliable. On the other hand if the iron is used on heavy work it is still unsatisfactory, because although it may be too hot, it will still not have a sufficient amount of heat stored to heat the large volume of metal. The spot where the iron touches may be overheated for an instant, then the heat will spread out and the temperature drop so that the rest of the area is still too cold.

Even for an expert at soldering the use of the wrong type of iron can make good quality soldering almost impossible. For a beginner the results can be disastrous. Quite a lot of people have lost interest in electronics because they could not solder without burning components and spoiling circuit boards. In almost every case the fault is not with the person, but due to him using the wrong soldering iron and, possibly, the wrong solder.

Now that you can see how important it is to choose the most suitable iron here are some hints which will help you:

1. Look for an iron which you find comfortable to hold. (You will be holding it a lot!) A light weight flex is an advantage because it does not drag when you move the iron around. Also make sure that the lead is long enough.

2. If you expect to do a lot of work with printed boards, transistors and integrated circuits then choose a small iron, but don't expect to be able to use it in heavier work. The power rating of such an iron would be from about 10 Watts to a maximum of about 20 Watts. A physically small iron which consumes more than this, say 25 or 30 Watts, will be in the 'universal' class mentioned above and will burn light work but still not have enough heat capacity for heavy work. Generally it will be an endless source of trouble.

3. If you are building only valve type equipment and want to solder tinplate then a 30 to 40 Watt iron would be more suitable. It should of course be much larger physically and have a bit at least a quarter of an inch in diameter. It will be too large for really fine work.

4. All modern soldering irons have replaceable bits. See that these are available when you buy the iron. With care, and an iron that does not overheat, the bit should last a long time but it is a good idea to have a spare in hand for when you need it. There are some fancy shaped bits available, but unless you are doing very specialised work they are not much use. A simple circular bar with the end filed at an angle of 30 to 45 degrees is all that is needed.

5. The above comments apply whether the iron is operated directly from the mains or from a low voltage transformer or battery. The heating effect depends on the power in watts and not on the voltage. It is largely a matter of personal preference as to which type you choose. The low voltage iron can be operated from a battery if necessary and is usually more robust and at the same time lighter than the mains iron. On the other hand it requires a battery or a bulky and expensive transformer.

6. Finally there are two special types of soldering iron which should be mentioned. There is the heat controlled type which warms up very quickly but never overheats. This is very nice if you can afford the price which mainly limits it to laboratory and professional use. The other type has a switch on the handle so that the iron can be switched on and off during the actual soldering operation. This is very useful if one is not soldering continuously as the iron heats up quickly and the temperature can be controlled. A fair amount of experience is necessary, because if one does not let the switch go soon enough, the iron can become red hot and everything burns. These irons are available in different sizes for light and heavy work.

When you have selected your iron, you should buy or make a suitable stand, and mount it firmly on the bench so that if the lead is accidentally pulled, the iron does not fall and smash on the floor, possibly giving you a nasty burn in the process. Incidentally, if you do drop your iron it is a natural reaction to try to catch it. You should learn to overcome this as you will invariably catch it by the hot part and get a very nasty burn. It is better to look down to where it is going to fall so that you are ready to pick it up by the handle as soon as it has touched the floor.

There is one final accessory that you will need. When you have been soldering for a while you will find you are either a **wiper** or a **flicker**. Even though the soldering iron bit does not get too hot or the solder burn off, it is still necessary when making a joint to have a bright and shiny film of solder on the point of the bit. If the iron has not been used for a couple of minutes, the surface of the solder on the bit becomes dull and this impedes the transfer of the heat to the joint. So to get a bright and shiny film of solder it is necessary to melt a little fresh solder on the bit just before using it. To remove the blob of solder thus formed one either wipes it off or flicks it off. The writer, a confirmed flicker from way back, has an open topped container about four inches square screwed to the workbench under the soldering iron stand. Over a period of months this box gradually fills with solder and saves a great deal of mess on the floor. The wipers should organise a similar box with a piece of sponge slightly damped, or a piece of rag.

That concludes the first part of our article on soldering. We will now consider the soldering operation itself and its application in various fields of electronics.

SOLDERING TECHNIQUE

Soldering is something like painting a house. If you have the correct materials and equipment, and the surfaces are perfectly prepared, the job is easy. If not then no amount of skill can make up for poor materials and lack of preparation.

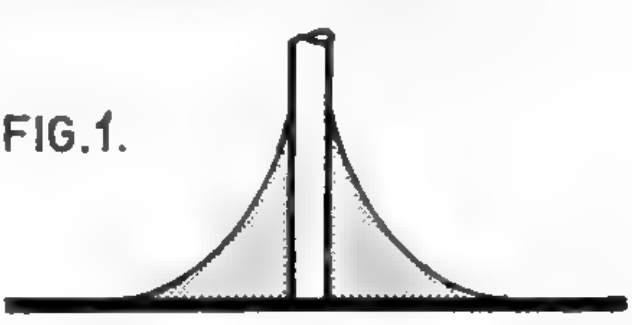
Careful preparation of the materials means seeing that they are bright and clean as mentioned earlier. Contrary to what many people seem to imagine, there is not the slightest need to wrap wires round tags or twist them together before soldering.

This idea has come about because some manufacturers assemble a lot of components and then solder the lot at once to save time. If you can't hold the wires and solder them at the same time there is no reason why you should not hook them together. It won't make the least difference to the strength of the joint. In fact a wrapped wire can sometimes make a badly soldered joint harder to detect. And if you want to dismantle the project later and use the components again a wrapped joint makes it very difficult to do so.

What is a properly soldered joint? If you have reasonable eyesight you will soon be able to see. The important characteristics are shown in Fig. 1. The sketch represents a wire being joined to a flat surface and on.

The solder should run or flow over the

FIG.1.



The solder flows along and up the wire, with the main body of solder being smooth and shiny without lumps.

FIG. 2.

Solder draws away from the surfaces.

metal and the wire. The usual description for this is that the surfaces are "wetted". The opposite situation is where the solder does not wet the surfaces but draws away from them like water on a greasy surface. This kind of poor or "dry" (opposite to wetted) joint is shown in Fig. 2.

If you see this effect anywhere on the joint you can be sure it is a bad one and it should be re-cleaned and re-soldered. If you ever want to remove the solder from a joint, then a piece of clean copper braid laid on the joint and heated with the soldering iron will soak up the solder as though it were blotting paper.

Finally, if the solder is not heated sufficiently, or the wire is moved before the joint has hardened properly you can get the kind of result shown in Fig. 3.

A joint which looks like this should be re-heated until it looks like the one in the first figure.

There is one general tip which applies to all soldered joints from the finest wire in a meter movement to the soldering of guttering and down pipes for a house. If you have any trouble making a good soldered joint take the joint apart and clean and tin each surface separately and only try to solder them together after both have been completely wetted with solder.

Incidentally if you use this method it is quite easy to solder a wire to a sheet of aluminium or two pieces of aluminium together. Provided of course that the soldering iron has enough heat capacity to bring the aluminium up to the soldering temperature. This is how it is done. Clean the surface of the aluminium as thoroughly as you can and put a drop of ordinary engine oil on it. Then, with a sharp knife or scriber, scratch the already cleaned surfaces of the aluminium underneath the oil film and, without wiping the oil away, tin the surface of the aluminium as you would do any other metal. Once it has been tinned you can solder any other tinned metal on to it. But remember that if the aluminium is even moderately thick you will need a very heavy iron (a very hot small iron is no substitute as has already been explained) in order to provide the large amount of heat needed to heat the aluminium.

That covers most of the basic information you will need to make a success of the craft of soldering — essential for everyone who works in electronics. The formula for success can be summed up as, preparation, the right tools and materials, practice and patience.

SEMICONDUCTORS — SPECIAL PRECAUTIONS

After everything has been wired up, and the joints are perfect, it is not very encouraging if you find the gadget you have built does not work. But this can happen when dealing with semiconductors such as transistors, FETs, or integrated circuits. Contrary to popular belief these will withstand a surprising amount of heating and bending or twisting of their leads. In many years of experimenting, the writer has never experienced a case where a transistor has been spoilt simply by overheating. Of course if you use a dirty iron and hold it on the pin of the transistor for a minute or two trying to make a good joint with dirty surfaces you will burn it up, but it will stand normal soldering perfectly well. In fact in some projects the same transistors and components have been taken out of a discarded circuit board and soldered into a new one as many as seven or eight times (another good reason for not wrapping leads), and they were still as good as ever.

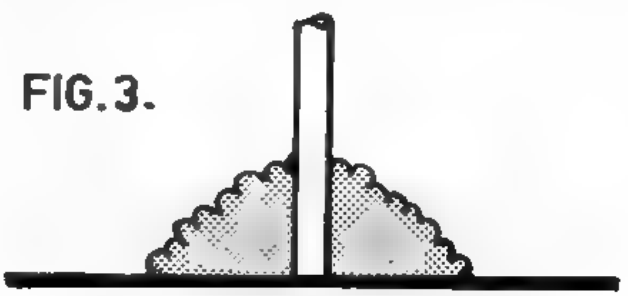
However, a few months ago I was working in another workshop with a strange soldering iron. I made a couple of joints and then discovered that a whole board full of integrated circuits had been ruined. I soon discovered the reason. The soldering iron was a low voltage one, fed from a transformer. The iron, as is usual with this type had the two leads from the transformer and no separate earth lead. When I put the probe of an oscilloscope on the tip of the iron I found there was no less than 150 volts of alternating voltage between the soldering iron and ground. This voltage is not dangerous because there is practically no current behind it. It is caused through capacity leakage between the windings of the transformer. You can experience the effect in another way if you can get a high impedance voltmeter or an oscilloscope. If you hold the probe in one hand, and take hold of ordinary mains flex in the other you will see if the flex has power on it. The instrument will indicate anything up to a hundred volts according to the type of flex, the floor you are standing on and so forth. You won't feel anything because as mentioned before there is almost no current. But this static voltage is quite sufficient to ruin semiconductors.

Although in most ways, semiconductors are far more robust than people give them credit for, there is one thing they can not take, and that is high reverse voltage. For example, a power transistor which will handle more than a hundred watts and will work with sixty to eighty volts and carry several amps, will go out like a light if it gets a reverse base-emitter voltage of more than five volts. Even amateurs who have worked with valve circuits for many years have almost given up using transistors because they have many failures and do not realise what is causing them. There would probably be even more failures but for the fact that most circuit boards, when being soldered, are isolated from any earth connection so that this voltage does not then appear across them.

This leads to the final recommendation: when soldering semiconductors either everything should be earthed or nothing should be earthed. If the soldering iron is not effectively earthed, then you cannot make alterations to the equipment unless it is completely isolated. This problem does not arise with valves and ordinary components because they are affected by this kind of static voltage.

There are many more practical tips one picks up through experience, but if you master the basic technique and start in the right way with a suitable iron and the correct solder you will have won the major battle. Good soldering! ●

FIG. 3.



Rough and dull surfaces.

Commercial Kinks

with Ron Fisher VK3OM

3 Fairview Ave., Glen Waverley, 3150

KEN KP202

The little KEN KP202 still evokes ideas for simple modifications. Any one who has used it for mobile work for any length of time will no doubt have discovered the problem of driving and operating the KEN at the same time. To start with, some form of external microphone possibly mounted on a boom or head band would be needed. Then, if some form of external operation of the push to talk switch could be devised, full remote operation of the KEN could be achieved. The first problem has been overcome by Mr. K. Moore, VK4IJ, the second has yet to be solved. Perhaps a solution might be a bracket which could be attached to the car dash board and fitted with a relay which mechanically operates the push to talk bar. In this way, no internal wiring changes would be required. All that is needed now is some bright person to work out the details. **(Such an article has been submitted by Mike O'Burtill, VK3WW, and will be published shortly—Ed.)**

However, back to the external microphone and over to VK4IJ.

"While it is possible to fit a relay and PTT for an external microphone it does involve considerable modification. I have fitted an external microphone and still use the PTT on the case. While this does involve two hand operation, it is an improvement when using an external aerial. The main problem was finding a small socket. Finally, two different types of eight pin IC sockets were found, one for the socket as shown in the first drawing and one for the plug as in the second.

These have connections in the form of flat pins which fit nicely into one another. The shielded cable from the microphone was soldered to two of the contacts and the whole top of the plug encased in araldite.

The socket was mounted on the sloping panel which carries the name plate. A sliding switch was fitted to cut off the internal microphone on the side of the bulge immediately alongside the grill covering the internal mic. This cuts out extraneous noises and possible echo with two microphones in parallel".

Another thought for mobile operation might be to use some of the vacant pins on the plug to bring out connections for an external speaker to give improved quality. ●

Try This

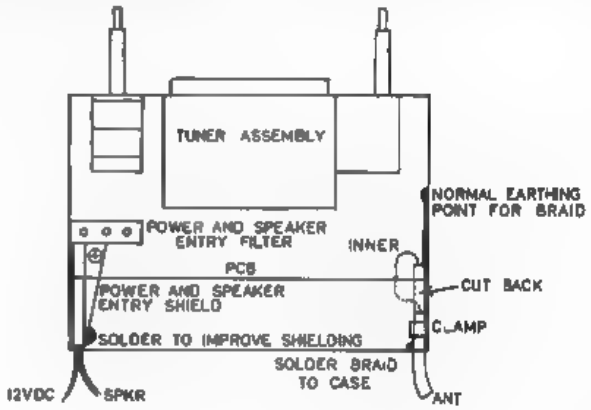
with Ron Cook VK3AFW

and Bill Rice VK3ABP

IGNITION NOISE REDUCTION

Many cheap car radios are now on the market which have both excellent sensitivity and selectivity. These can be used as tunable IFs for VHF as well as their primary function of broadcast reception. However, when used in a car, the ignition interference has to be heard to be believed. The suppression kit supplied and the usual suppression procedures appear to have little effect on the residual noise level. When the case of the radio is opened, input filtering of speaker and power leads is evident, although this may be improved by an auxiliary lowpass filter using a toroidal choke and disc ceramics. This is only a partial cure. Closer investigation will reveal that the input filter and the antenna lead in earthing points are up to 50 mm from the rear of the case. This results in an effective 1 turn loop coupling noise into the case. Earthing of the antenna coax braid at the point of entry by soldering it directly to the case and similarly soldering the bent metal power and speaker entry shield will result in a large improvement, to the point of elimination, of the interference.

G. Sones, VK3AUI ●



HUNTING LIONS IN THE AIR

(Reprinted from the Australian LION Magazine, November 1974)

Lions and Leos whose hobby is ham radio will once again make contacts in the name of international friendship and understanding, when the annual "Hunting Lions in the Air" contest hits the airwaves on January 11, 1975.

Originated in 1971 under the sponsorship of the Rio de Janeiro (Arpoador) Lions, the first "hunt" showed 1,550 operators in 26 countries on five continents participating. Since then, the contest has expanded to a network that spans the globe.

Open to all licensed radio operators, Lions, Leos and non-Lions, the contest will begin at 1200 GMT on January 11. It will run for 24 hours, using the top 25 kHz of the 40, 20, 15 and 10 phone and CW bands.

Amateur radio operators participating in the contest will transmit by calling "CQ . . . Contest — 'Hunting Lions in the Air' — Lions International" together with his prefix. When a contact is made, the operator will state his QRA, QTH, the number of contacts, and the QTR (hour) of each. Lion and Leo members should identify their club names as well.

Each participant will note in his log the QTR, the prefix of the station contacted, and, if the contact is a Lion or Leo, the name of the club. Log entries will be confirmed by comparing the logs of the participating clubs.

Within 30 days of the end of the contest, each contestant must send his log sheets to:

Contest Committee
Hunting Lions in the Air
Lions Club of Rio de Janeiro (Arpoador)
Rua Souza Lima no. 310 —
Apartamento 802
Rio de Janeiro—[illegible]

The Arpoador Lions will verify point totals after examining logs submitted to them by contestants. One point will be given for each communication, with no extra points allowed for more than one contact with the same station.

Each communication made with a radio operator who is also a Lion will have a two point value when verified with the log of the Lion contact. For contacts made with Lion radio operators from the Lions club of Rio de Janeiro (Arpoador) and the Lions club of Curitiba (Marumbi), the following points will be awarded: (a) within Brazil — 3 points, (b) participants from other countries who make contacts with two above-mentioned clubs — 5 points for each participant.

After verifying point totals, the contest committee will refer the results to the co-ordinating club. They, in turn, will submit a report to the chairman of the International Understanding and Youth Exchange Committee of the International Board of Directors before May 15 of the current year.

Lions International will then present first, second and third place awards in two categories — phone and code (CW). The first place winner in each category will receive a trophy; the second place winner in each category will receive a trophy medallion, the third place winner in each category will receive a plaque.

The Lions club of Rio de Janeiro (Arpoador) and Curitiba (Marumbi) will award medallions in vermillion with identical inscriptions to the fourth through tenth place winners in each category.

Each contestant making more than 20 points will receive a QSL from the Arpoador Lions.

Lions and Leos may invite non-club members to join the world-wide radio hookup. However, a Lion or Leo should be present during all con-

tacts and should take care to explain to non-members the purposes and ideals of Lions International with regard to international understanding.

"Hunting Lions in the Air" is a unique yet effective method whereby initial contacts are formed, contacts which have the potential for lasting international friendships between individuals and clubs. It is a special way for Lions and Leos to reach hands across borders via the unseen roadways of the air. Won't you join in this "contest" of communication?

Awards Column

with [illegible] AUSTIN, [illegible]
P.O. Box 7A, Crafers, SA 5152

WADM SERIES

1. The awards are available to licensed amateurs and shortwave listeners (on a "heard" basis).
2. Contacts after 14.7.1953 are valid for WADM 1, 2 and 3 and after 1.1.1966 for WADM 4 and 5.
3. Do not send QSL cards. A list, showing full details of the contacts should be certified by two licensed amateurs or a club official.
4. WADM 1 to 4 is issued for CW, phone or 2 x SSB but not mixed modes. It is NOT available to shortwave listeners for 2 x SSB. WADM 5 is issued for CW or phone but not mixed modes.
5. The fee for each award is 7 IRCs.
6. The address for applications is:
   Radioklub Der DDR
   DM Award Bureau
   DDR—1055 Berlin
   Hosemannstrasse 14 DDR.

Rules:

East Germany is divided into 10 districts, denoted by the LAST letter of the call sign (DM2 BCD is District D).

Each district may be contacted ONCE per band for WADM 1 to 3.3 and each contact is ONE point. If, however, the same station is contacted on four or five bands then four or five extra points are counted (DM2ABB on five bands counts as five band points and five extra points).

A "special station" may be substituted for any missing district on the same band as the QSL from the special station but once only per band. WADM 4 and 5 are available on one band only — see below.

Requirements:

- WADM 5 — 10 points, with 10 districts on either 3.5 MHz or 28 MHz.
- WADM 4 — 20 points, with 10 districts represented on 3.5 or 28 MHz.
- WADM 3 — European stations require 40 points with 13 districts represented and non-European stations require 32 points with 13 districts represented.
- WADM 2 — European stations require 75 points with 15 districts represented and non-European stations require 45 points with 15 districts represented
- WADM 1 — European stations require 120 points with 15 districts represented and non-European stations require 75 points with 15 districts represented.

DM Calls:

The number in the call sign means —

DM2	Private stations
DM3, 4, 5	Club stations
DM6	District special stations
DM7	Reserve
DM8	Special stations
DM9	Foreign amateurs
DM0	Central and special stations

9HI AWARD

1. The award is available to licensed amateurs and shortwave listeners.
2. Contacts after 21.9.1964 (Independence Day) are valid.
3. Do not send QSL cards. A list showing full details of the contacts should be certified by the Awards Manager of a National Society.
4. The fee for the award is $1 or 10 IRCs.
5. The address for applications is
   Malta Amateur Radio Society
   "Mayfair" New Street
   off Ursuline Sisters Street
   Guardamangia
   [illegible]

Rules:

The same station may counted once per band. Only 5 bands may be used.

9HI SWL cards may be used (provided that SWL has received a reply) on the bands on which the report was made — up to a maximum of 2.

Band points:

CQ Magazine Zone	1.8	3.5	7.0	14.0	21.0	28.0	*
	Points per contact						
14 15 16 33 34	5	3	2	1	3	5	25
All other Zones, except as under	15	12	6	2	6	10	45
Areas north of Arctic Circle and south of Antarctic Circle	3	25	15	5	12	20	50

*all other bands

Requirements:

50 points required for one band working
40 points required for two bands working
30 points required for three bands working
20 points required for four bands working

Magazine Index

With Syd Clark, VK3ASC

Before commencing the indexing of this month's bag of overseas amateur journals I would like to take this opportunity of wishing my readers the "Compliments of the Season".

RADIO ZS June, July, August & September
"You're Off Frequency Old Man"; Reminiscences of ZS Ancient Radio Practitioner; Thank You Hams.
The Port Elizabeth 2-metre Repeater; South African Police Wachthuis Radio Reserve.
Speech Processing; Extracts from the Radio Regulations; Omega.
Hamnet; Yacht Surprise; R.F. Power Measurement; Electronic Breakthrough for Instant TV; New Swop Shop; They Probably Wouldn't but They Just Might.

RADIO COMMUNICATION August & September
A Speech Clipper for SSB Transmitters; And it Can be Done . . .!; Performance of Transistorised Car Ignition; Technical Topics; Building Blocks for the Novice.
A Self Contained High-Power Linear Amplifier for the HF Bands; Building Blocks for the Novice. An SL600 Series SSB Transceiver; A Three-Stage Pre-Amplifier for the 1296 MHz Band; Modifications to a Trap Dipole; Technical Topics.

BREAK-IN September 1974
Let's Build a Keyer; A 20/15/10 Metre Triband Vertical; Satellites in the Amateur Radio Service, Crystal Checker; The Surprise Story.

73 MAGAZINE July & September 1974
4-1000A Grounded Grid Linear; Free TT Batteries; The Scotch Transistor; Poor Man's Universal Frequency Generator; Universal AFSK Generator; A Cheap Ten Minute Timer for the Shack; A Low Frequency Phased Array; DC Isolation; Little Bill; 3 kV DC Power Supply; Diagrams.
Moskey; A Ham Radio Severe Weather Warning Net; The Agitable; LXpedition; 50 Megahertz DX; Questions Questions Questions; Improve your Heath 10-103, Mono Reproducer; Low Power 6 Metre AM Transmitter; Inexpensive RF Speech Clipper; Professor Beams Special Lecture to Class; My Favourite Band; The Audio Bishop; 4UITU Geneva; Use that 120 volt Variac on a 220 volt Circuit, Western Satellite Picture on Your SSTV Monitors; Someone Should Do Something About . . .; Nostalgia; A Universal IC Tester; Tabus; Making it Small; Easy-Way Tower; Low Cost Infinite Attenuator for Amateur Use; Lightning in a Bottle — Flashtubes, Modernising the Select-o-Ject; Profile Roy Alclatore WSRU; It Happened in Mexico! . . .

QST October 1974
A New Front End for Direct-Conversion Receivers; Dipole Passe?; Solid-State Repeater Control; Apartment Dwellers Slinky Jr Antenna; An All Solid-State Keyer for Cathode-Keyed Transmitters; The Twenty-Metre DX Weasel; Repacking the Ten-Tec Power Mite; A Remote Head; Two-Toter Two; Reviews of: Curtis Electro Devices KB-4200 Morse Keyboard; Regency HRT-2 FM Transceiver; The Henry Radio Kenwood Pair; Spectrum International UHF Equipment; Getting Told the Ham Story; Amateur Radio in our Independent Civilisation; Tornadoes Strike . . . Hams Help.

HAM RADIO August & September
High-Power Solid State Linear Power Amplifier; How to calculate Wind Loading on Towers and Antenna Structures, Scanning Receivers for Two-Metre FM; Integrated-Circuit SSB Transceiver Harmonic Phase Detector, Amateur Marine Installations Small Boat Style, Electronic Speed Control for RTTY Machines, Battery Power
Easy-to-Build SSB Transceiver for 1296 MHz, Miniaturised Communications Receiver; Intermodulation Measurements on SSB Transmitters; Modern RF Amplifiers for Communications Receivers, Design Data for Pipe Masts, Reciprocating Detector Converter; Miniature Filament Transformers, Versatile Squelch-Audio Amplifier for FM Receivers. Adding Carriage Return to the Automatic Line-Feed Generator

PROJECT AUSTRALIS

with David Hull VK3ZDH

OSCAR 6 EQUATOR CROSSINGS FOR "ON" ORBITS OVER VK — JAN. 1975
(Dates local, Times Z)

Orbit No.	Time (Z)	Equator Cross (°W)
Thurs. 2/1/75		
10126	0744	164
10127	0939	193
10128	1134	221
Sat. 4/1/75		
10151	0739	153
10152	0934	191
10153	1129	220
Sun. 5/1/75		
10157	1909	335
10158	2104	4
10159	2259	33
Mon. 6/1/75		
10176	0734	161
10177	0929	190
10178	1124	219
Thurs. 9/1/75		
10214	0824	174
10215	1019	202
10216	1214	231
Sat. 11/1/75		
10239	0819	172
10240	1014	201
10241	1209	230
Sun. 12/1/75		
10245	1949	345
10246	2144	14
10247	2339	42
Mon. 13/1/75		
10246	0814	171
10265	1009	200
10266	1204	229
Thur. 16/1/75		
10302	0903	184
10303	1058	212
10304	1253	241
Sat. 18/1/75		
10327	0858	182
10328	1053	211
10329	1248	240
Sun. 19/1/75		
10332	1833	326
10333	2028	355
10334	2223	24
Mon. 20/1/75		
10352	0853	181
10353	1048	210
10354	1243	238
Thurs. 23/1/75		
10389	0748	165
10390	0943	193
10393	1138	222
Sat. 25/1/75		
10414	0743	163
10415	0938	192
10416	1133	221
Sun. 26/1/75		
10420	1913	336
10421	2108	5
10422	2303	33
Mon. 27/1/75		
10439	0738	162
10440	0933	191
10441	1128	220
Thurs. 30/1/75		
10477	0827	175
10478	1022	203
10479	1217	232

See notes in Nov AR.

It was hoped to supply at least preferance orbits for Oscar 7 by this time (late Nov.) but so far all supplied orbit data has been wildly inacurate after a few days. Please listen to local division broadcasts for later details. Australis will keep state co-ordinators advised as data is made available.

Book Review

"LET'S TALK TRANSISTORS"

Robert Stoffels is an author who is recognised as an authority on his subject.

In this nine-part series, now assembled into one pamphlet by the ARRL, is packed a considerable amount of information to set students of Electronics on the road to success in a discipline which challenges the most vivid of imaginations.

Available as a re-print from "Magpubs" at $0.95 plus 25c postage.

VK3ASC

VHF UHF
an expanding world
with Eric Jamieson VK5LP

Forreston, S.A., 5233

...mes: GMT

AMATEUR BAND BEACONS FOR JANUARY 1975

VK0	VK0MA, Mawson	53.100
	VK0GR, Casey	53.200
VK1	VK1RTA, Canberra	144.475
VK2	VK2WI Sydney	52.450
	VK2WI, Sydney	144.010
VK3	VK3RTG, Vermont	144.700
VK4	VK4RTL, Townsville	52.600
	VK4WI/1, Mt Mowbullan	144.400
VK5	VK5VF, Mt. Lofty	53.000
	VK5VF, Mt. Lofty	144.800
VK6	VK6RTV Perth	52.300
	VK6RTU, Kalgoorlie	52.350
	VK6RTW, Albany	144.500
	VK6RTV, Perth	145.000
VK7	VK7RTX, Devonport	144.900
VK8	VK8VF, Darwin	52.200
P29	P29GA, Lae, Niugini	52.150
3D3	3D3AA, Suva, Fiji	52.500
ZL1	ZL1VHF, Auckland	145.100
	ZL1VHW, Waikato	145.150
ZL2	ZL2VHF, Wellington	145.200
	ZL2VHP, Palmerston North	145.250
ZL3	ZL3VHF, Christchurch	145.300
ZL4	ZL4VHF, Dunedin	145.400

Main changes to beacon listings this month are deletions, which should bring the list to being substantially correct. First news came from Steve VK3ZAZ that there would be little likelihood of any VK0 6 metre contacts this year due to shortage of operators. Confirmation of this, and further news that the Macquarie Island beacon was not on the air, came in a letter from Don VK3AKN who advised that as a result of a contact with Dave VK0DM on Macquarie Island first hand news of the VK0RSA beacon was on hand. It appears the original location caused severe problems with the HF equipment, and so it was switched off. Another location was tried later but then interference resulted to physics equipment, so it is now off at least until next March when it is hoped to have a third try to find a suitable operating position. No confirmation at present of the Mawson and Casey beacons but these have been left on the list for now

The Carnarvon beacon VK6RTT is also off the air, and resting on a shelf, mainly due to lack of operators in that area. The P29GA beacon should be all solid state by the time you read this, with a photo-electric keyer with "P29GA LAE PNG" ident. continuously on 52.150 to a 2 wavelength collinear

George VK3ASV advises the Eastern Zone of VK3 two metre beacon is not likely to be operating for some time yet, further advice later on. As it to confirm my comment last month on lack of a channel for JA1IGY due to heavy band population on 6 metres in Japan, George VK3ASV has included a comment in the Eastern Zone Bulletin that as of March 1974 the number of Japanese amateur station licences issued was 436,377, and may be 500,000 by Christmas. If only 10 per cent of these operated on 6 metres that's 50,000, and if only 10 per cent of these were on 50-54 MHz at any one time, that's less than 1 kHz per operator — see what I mean? Imagine having 1,000 operators on an FM channel at one time — and I heard someone on Channel 4 the other day complain that the repeater always seems to be occupied!!

SO WHERE AM I?

What else is the main topic at the moment on the VHF bands? As was predicted earlier this year, 1974 looks like being a real bumper year for VHF contacts. At time of writing (late November) no 2 metre contacts have been made but these could have eventuated by the time you read this — however, that's for next month — concern for the moment must go to six metres. Openings started towards the end of October, and came along with a vengeance in November, some of the best early openings for many years, probably since 1963. All VK States, P29 and ZL1 to 4 inclusive have been the order of the day frequently. After waiting 11 years between, I worked my second ZL4 on 20/11 when Stan ZL4MB came on for a brief burst. At the same time Eric ZL3QE was S9 + 20, the strongest I have ever heard a ZL station, so if I have to wait for ZL3s to be that strong it may be a long time before I work my third ZL4! However, be that as it may, there appears to be plenty of 6 metre activity in ZL this year, and it is pleasing to see those boys recognising that most VK stations are now operating transceive, and so coming up into our 52 MHz segment to allow SSB transceive contacts to be made. Very few modern 6 metre stations today would have separate VFO tuning ability for VHF, so it is necessary for the ZLs to come up to us as we are unable to go down to them.

Pleased also to work Noel P29GA again this year, and grateful indeed are we that he is interested enough to keep that beacon going on 52.150. In a letter to me Noel mentions quite successful operation through Oscar 6 since 29/10, having worked VK2, 3, 5 and 7, and heard DU and JA stations. Good luck Noel, and thanks for the letter.

A pleasing feature of DX so far this season has been the very wide-spread nature of the contacts — openings to as many as four or five States at once, plus ZL. Long distance contacts are more common too, VK4 to VK8, VK5 to VK8, VK5 to P29, VK5 to ZL, VK4 to ZL etc. Northern VK4 stations have been heard more often, and all signals have been consistently good.

AM stations have almost disappeared from 6 metres it seems, and FT620s have taken their place, some barefoot, others with good sized linears. There is no doubt whatever that the SSB signals on VHF are readable for longer, and at much lower signal strength than the former AM signals, and do not suffer the same phase distortion (to the ear anyway) that the other mode does, during fading periods. At the same time signals are generally well stabilized, and with most operating transceive, it is inevitable more contacts must be made.

My nearest amateur neighbour, Fred VK5FT, about 1 mile away, and separated by 1,000 feet of hill, has finally succumbed to the thrill of 6 metres after purchasing a 6 metre device. Being a dozen of HF operation, particularly the R.D. Contest, Fred has a veritable antenna farm of sundry V beams pointing in all directions, switchable from the shack. These have been pressed into service through a suitable tuning unit, and Fred has been sending out some mighty 6 metre signals from 10 or so watts — how he gets out from behind those hills I just don't know, but he's doing it. Welcome to the bands, Fred. What about some of the others in the HF gangs around VK helping to populate our VHF bands. Suitable commercial equipment does not cost that much nowadays if you do not have the time to build something, and many of you smoke more cigarettes in a year than the cost of a good transceiver for 6 metres!

Don VK3AKN advises in his letter that Western Victoria is having its share of VHF SSB operators, some still building and testing. Most monitor 52.050. I quote the following from Don's letter as it is of interest. "Recent tropospheric openings have of course resulted in some severe shambles when Melbourne stations have been hearing and triggering our repeater Ch. 1 at Mt. William and fondly imagining they were working through VK3WI/R1 on Mt. Dandenong. I get the impression that many of the repeater operators do not have a clue as to what goes on. Such openings are described as 'unusual' or 'freak', and you can't tell them that they are as normal as the rain in winter." There are many excellent articles written on the subject of VHF propagation and, for those not so well informed on such matters, make very interesting reading, and will at the same time give a better understanding of such phenomena.

TWO MORE ETC.

Kerry VK5SU at Ceduna sent along an interesting letter, too long for inclusion of course as the information keeps me informed, but I would like to mention one day, 9th November, as an indicator of the excellent state of VHF Ceduna to 550 km from Adelaide. Times stated for this particular exercise are Eastern Summer Time, as the information is only likely to be of interest to VK, and therefore such times relate more easily to the situation at the time.

0830 VK5VF beacon on 144.800 S5, Ch. 4 repeater Adelaide audible.
0837 Trigger unknown Ch. 2 repeater.
1130 VK5VF S5. Trigger Ch. 4.
1330 2 metre fade-out.

Away from home during rest of day and evening.

0025 Worked VK5ZMJ at Pt. Pirie (500 km) via Ch. 4 Adelaide!
0030 Worked VK5PB via Ch 4, also 144.010 SSB, VK5ZPS 144.010 and 52.060. Worked VK5PB various cross band duplex e.g. 2 x SSB 2m repeater and 6 metres.
0100 Trigger Mt. William (Victoria) Ch. 1 repeater Various Adelaide stations on Ch. 4.
0300 Trigger Mt. William using 1 watt Signal 30dB over 9 on IC-22 S meter
0350 VK5ZTS went up to Mt. Lofty, worked mobile via Ch. 4, then directly on Ch. 8 using ¼ wave whip on car, and 52.525 FM. VK5ZTS was using a mismatched 6m dipole clipped to car and 2 feet above ground!
0504 Heard VK3LX and VK3ALU mobile via Ch. 1 repeater (Kerry notes: it is still uncertain if this was Ch. 1 Mt William or Mt. Dandenong as neither repeater has auto ident like Adelaide Distance to Mt William 1016 km and Melbourne 1240 km).
0620 VK3AV, VK3AKN and VK3BDH via Mt William, many Adelaide stations.
0633 VK5CU direct on Ch. 50. VK3BRB and VK3YEJ, both Mildura, via Mt. William repeater VK5WI broadcast on Ch. 4.
1000 VK5VF on 2m S9.
1015 VK5VF etc. all inaudible.
1305 VK6ZDY, VK6ZHJ, VK6ZBW and VK6ZBM Kalgoorlie on 6m.

And then to work!

That is really dedication for you. No sleep for one complete night, two periods of work, rest of the time operating various bands, and making plenty of interesting contacts. Just shows what can be done if you have the gear, the time and the dedication, and the band conditions are right. And look at the time VK5ZTS got the car out and went up to Mt. Lofty, 0350 in the morning! Can't be married surely! My doghouse wouldn't be big enough if I tried that! Thanks Kerry for a very interesting letter; more please.

BITS AND PIECES

John VK4ZJB advises after 1st December he will be out each week-end on his favourite mountain with 400 watts of SSB on 6m, and from Wednesday 25th to Sunday 29th December inclusive. Did not say whether he would have 2 metres . . . Our old friend Lindsay VK4ZIM now has the call of VK4AAL, still with the excellent signal as before . Steve VK3ZAZ not now going to Norfolk Island, costs have risen too high with recent increases in plane fares and accommodation . . . about 20/10/74 HL9WI worked by VK4RO, VK4QS, VK4ZRG and VK4AAL . . . VK4RO will be on 144.090 this year crystal locked . . . colour TV from ZL has been viewed in Sydney . . . VK8VF being heard from Darwin around VK, but very little heard of amateurs from same area . Rod VK2ZQJ now sporting new call of VK2BQJ, has not spoken to me yet!

PORTABLE OPERATION

You are reminded that a number of stations will be out portable over the Christmas-New Year period again this year. Details of all known operation were included in the December issue. It is hoped as many as possible of the home stations will be on the air to make the efforts of those camped on mountain tops worthwhile. Two metre and 432 MHz will particularly be in demand.

NEW CHANNEL 5A STATIONS

I am sure the dedicated VHF operators around Australia read with dismay recently that new Channel 5A TV stations are to be scattered all around the countryside, high power stations at Loxton S.A. and Gosford N.S.W and one other place I have temporarily forgotten, plus translators and repeaters of low power. What a dismal thought. The high power stations are bad enough with the amount of garbage they put on to 144 MHz, even if the spurious responses are within specified

limits, 50 dB down from 100 kW ERP is still plenty strong enough to spoil reception efforts by the amateurs. Low power stations simply means that amateur operators within the limited service area of such stations just won't be able to come on because of TVI. Some areas have already been severely affected because of Channel 0 operations, now it seems the one world wide VHF band left to us is to be smothered with rubbish or at best will stop operators from coming on during TV hours.

The following comment is purely my own opinion, and I want it to be known as such. I knew it had to come. With the clamour going on from vested interests for the FM band to be opened up, the P.M.G. has little option but to make available the same frequencies as used overseas for FM (88 to 108 MHz) which means a shift around of TV channels. Greedy eyes have long been cast on 144 to 148 MHz by the commercial interests as being an area of small activity overall, but one providing quite a few two-way radio channels if it could be wrested from the amateurs. Unfortunately there are many of you who read this who have done nothing or very little to keep the band in constant use, and so added to the problem. There are probably several thousand operators throughout Australia who use some portion of 144-148 MHz, a very small percentage use the lower tuneable portions, whilst the majority sit on a few FM channels about the middle of the band and contribute nothing towards general band occupancy elsewhere. It is interesting to note that in the main the operators who use the tuneable portion of the band also have FM capability. In other words, they have spread their interest to include a wider area of operation. And I suppose now with more compatible repeater channels covering the countryside, city operators will be content to work two metres DX through a repeater. In case anyone gets the wrong idea, I have worked on 2 metres tuneable for years, first with AM and latterly with SSB, both home and portable. I also can work on at least three FM channels including Ch. 4 repeater, and I do use FM from time to time, so my interests are not narrow.

I personally see the widespread use of Channel 5A as the thin edge of the wedge, gradually easing out operation on the lower part of 144-148 MHz by the amateurs due to QRM and TVI. In the end we will be told that as we do not use 144 to 148 we do not need it, so will lose it, after all, most operation is above 146 MHz, and it is easily proved we can get by with three or four FM channels, no worry! And that's all we will have.

I can never understand why in Australia there seems to be so much pressure for spectrum space, with eyes constantly looking at the few MHz we have. In the U.S.A. they seem to be able to manage in a country about the same size as ours, and with a few more people, nearly 200 million more in fact, and I think they would surely have a few more radio telephone and similar services than we do, and more TV and radio stations, and more FM stations, and with only the same amount of spectrum space. Just makes me wonder what is behind it all.

So, all you amateurs who operate on VHF, you had better start doing some thinking pretty soon and get some more gear operating on other places than purely FM channels, or is that all you really want? If I were a betting man, I would take even money that if Melbourne is to have a fourth commercial channel, or another channel anyway, in the future, it will be on Channel 5A. Sydney, the other centre of population able to support a fourth commercial channel, probably will miss out on a 5A, but then they have one either side, at Wollongong and the new one at Gosford. Overall, the situation looks very bleak for amateur radio in the future, and what will you do about? Nothing?

It seems a pity to end these notes on such a pessimistic note, but those are the facts. I can only hope 1975 will finish a little brighter than it looks like starting. However, plenty of DX on 2 metres during 1975, it may be the last you will work in some areas, ever. The thought for the month: 'A newspaper is not just for reporting the news as it is, but to make people mad enough to do something about it.' Quite relevant, I believe.

The Voice in the Hills

Contests

with Jim Payne, VK3AZT

Federal Contest Manager,
Box 67, East Melbourne, Vic., 3002

CONTEST CALENDAR

Nov to Jan 19: Ross Hull VHF-UHF
Jan 8-9: YL-DX to Nth America (CW)
Jan 29-30: YL-DX to Nth America (Phone)
Jan 11-12: YU 80 metre CW
Jan 11 12: DL QRP CW
Jan 18: RTTY Flash Contest (Italy)
Jan 24-26: CQ WW 160 CW
Jan 25-26: French CW
Feb 1-2: ARRL DX Phone
Feb 8-9: John Moyle Field day
Feb 15-16 ARRL DX CW
Feb 22-23: French phone

REMEMBRANCE DAY CONTEST

All the certificates for this contest have been posted and logs returned to those contestants who requested same. Please let me know if yours has not arrived.

YL-DX TO NTH AMERICA CONTEST

YLs on Nth American continent will be working DX YL's. Phone & CW are separate contests and require separate logs. Same station may be worked on each band for QSO credit and only QSO's with other YLs are valid. Please send SASE to FCM for details.

ARRL INTERNATIONAL DX COMPETITION:

Phone — first full weekends Feb & Mar.CW — Third full weekends in Feb & Mar, Starts 0001 GMT Sat. ends 2400 GMT Sun.

Classes — Single op: All band; high band (20, 15, 10); Low band (160, 80, 40); enter only one. Multi op: single Tx or Multi Tx. All band only.

Object — DX stations QSO as many stations in the 48 contiguous US and Canadian call areas as possible. Repeat contacts on additional bands are permitted.

Points — Each complete contact 3 points, incomplete count 2 points.

Exchange — Send RS(T) and DC input power. The W/VE will transmit RS(T) and his state or province.

Multiplier — On each band your multipliers are the 48 contiguous US, plus VE1 through VE8 and VO; a total of 57. Your final multiplier is the sum of multipliers worked on each band. QSO points times the final multiplier equals claimed score.

Logs — Must contain dates, times in GMT, bands, exchanges and points. Signed legible copies of your station log are acceptable. Logs must be accompanied by a summary showing valid QSO's and multipliers for each band, and a multiplier check sheet showing the number of contacts with each of the 57 states on each band. Logs etc. must reach ARRL, 225 Main St., Newington, Connecticut, USA 06111, before last Monday in April.

BARTG SPRING RTTY CONTEST

Ted, G8CDW BARTG Contests and Awards Manager has sent particulars of the latest RTTY contest to be arranged by the British Amateur Radio Teleprinter Group. The contest will be held from 0200 GMT on Sat Mar 22nd until 0200 GMT Mon Mar 24th, 1975. Please send SASE to FCM for details.

JOHN MOYLE MEMORIAL NATIONAL FIELD DAY

It's on Feb 8th and 9th, 1975. See Dec issue for details. Making yourself independent of the power mains limits the number of high power SSB stations which can be heard in this contest as portable units. However, if you can't be in the field please tune up at home and send in your log in due course.

Intruder Watch

with Alf Chandler VK3LC

1535 High Street, Glen Iris 3146

As I missed out on the December issue I must hereby wish all Members a Happy and Prosperous New Year, and may 1975 fulfil all your wishes.

From reports received it seems that the 3.5 MHz band is being clobbered by Broadcast stations at the present time. It may be presumed that the 7 MHz band is so full of these insiduous broadcasters that the 3.5 MHz band has become more profitable to the newcomers because of the good propagation now. In any case the following frequencies have been reported as being occupied, but I would appreciate identifications of call signs or country of origin if Members would mind taking the trouble to listen at various times in the hope that some may be given. The reports all, so far have been submitted by the VK6 Division. Times of observations are 1100 to 1230 GMT.

3512	A3	Female singer.
3528	A3	Singing group.
3535	A3	Dialogue, male and female.
3560	A3	Piano and orchestra male announcer
3580	A3	Woman singing.
3632	A3	Foreign language
3641	A3	Musical programme
3695.5	A3	Foreign language.

Would you please refer to my 'Letter to the Editor" regarding jamming and jammers. Good hunting.

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

The Editor
Dear Sir,

I feel that I must comment on a piece of information contained in the letter by VK5JE in the October issue of the magazine.

John my boy, you are a little off beam!

The WIA "started the ball rolling" as you put it some years ago when I advocated the formation of what I designated 'The QRM Brigade.' Unfortunately, this has not been utilised as much as I had visualised, some members being opposed for ethical reasons. However, it has been useful and effective when used by those who have participated. It is most effective with those point to point CW intruders.

I cannot agree that "it is a long and sometimes hopeless process in getting rid of them". We have many successes internationally and two instances immediately come to mind — we had a South American News Agency station in the 21 MHz band, and we couldn't get his call sign until a German Amateur reported him and gave us the call. By co-operation between countries this station was removed. Another instance — we couldn't get an identification on a station on 14231.7 kHz for a long time, but it eventually turned out to be a Thai station. With Amateur methods we ran it down to a broadcast transmitter of the local television company at the airport in Bangkok. We found out it was an old transmitter, but they didn't want to replace it because they hoped it would stand up for a little while longer. We managed to persuade them to take it off that frequency. Thus you see, we have had our successes.

As I mentioned in my Intruder Watch column in the normal sense Jammers are far more insidious than the actual stations being jammed, the main reason being that they use far more of the band. I would heartily congratulate anybody who could get the co-operation of the ARRL, the RSGB and especially the JARL, or our own Administration on the aspect of 'controlled jammers".

Go to it, John and get together a CW net who are prepared to operate my "QRM Brigade" idea. You're in the clear.

Alf Chandler, VK3LC
Intruder Watch Co-ordinator for WIA

The Editor,
Dear Sir,

I still can't figure out why the Amateur Service is screaming over the increase of the cost of the licence to $12.00.

If the subject is looked at in the broad sense the following points must surely evolve —

1. The commercial services now pay $20.00 for a base and $12.00 for each mobile.
2. The handphone service costs $12.00 for each unit, however the licence provides for at least a pair of handphones, thus $24.00 per annum.
3. The amateur licence allows each proprietor the use of mobiles, which can be crammed with as many transmitters as desired, and that same licence permits the operation of a separate base station with another compliment of

transmission gear including television if required.

4. Despite the fact that the broadcast and television receiving licence has been scrapped, we still are told of cases of hardship — if that is found to be so, the matter should naturally be looked into by the Institute.

So what's the beef — it's a bargain!!

M. R. Morris, L30134

The Editor,
Dear Sir,

Are we in VK considering changing our call sign to G? You must be joking.

In these days of unemployment benefits, retrenchment benefits and Government handouts the VK amateurs are jumping on the bandwagon and saying that $12 for a licence is too much, and we want a benefit handout as well.

This $12 fee is cheap. About 50 middies per year or one per week or 25 packs of cigarettes per year or ten per week and so I could go on.

Alright the cry goes up "what about our senior and junior members". O.K. what about them, why don't **WE** as an Institute, do something instead of whinge.

Most Divisions look after their senior and junior members by having a lower fee structure, so why not for the same price include a licence. But don't ask for a Government handout. No! Ask it of every WIA member. For that lower fee the local Division could buy that right, **BUY** the licence for each senior and junior member and this would be subsidised by all other WIA members.

We must learn to help ourselves as an Institute and stick together rather than cry poor-mouth to the Government.

We should be showing the administration that WE as an Institute can, and are, united and able to look after ourselves; then, when an important crisis occurs, our voice will be heard.

Members, stop crying WOLF and unite.

Wally Watkins, VK2ZNW

Book Review

THE ARRL ANTENNA BOOK

The 13th Edition of THE ARRL ANTENNA BOOK represents the most extensive revision this publication has received within the past 25 years. Although much of the basic information of previous editions on subjects such as radio wave propagation and antenna theory has been retained in early chapters of the book, all information has been carefully edited for clarity and has been supplemented with later data where modern technology has brought new knowledge.

In the later chapters some striking changes from previous editions will be noted. A large section appears on the use of the Smith Chart in solving transmission-line problems. Information on cubical-quad antennas has been greatly expanded. Design and construction information on log-periodic antennas has been added. Construction information on "standard" antennas — dipoles, Yagis, and simple arrays — has been revised extensively, and new antenna types such as a 40-meter "sloper" are described. Information on rotator and tower selection and installation has been added.

Four new chapters appear in the 13th Edition, one on antennas for restricted space, one on antennas for space communications, one on measurements, and one on specialised antennas that amateur radio enthusiasts often hear about but are unable to find information on — the Beverage, discone, conical monopole, fishbone, bobtail curtain, and others. From its newly designed front cover, which retains a bit of the appearance of the covers of older editions, to its completely new index at the back, this edition is packed with useful information on all types of practical antennas.

Hamads

- Eight lines free to all W.I.A. members. $6 per 3 cms. for other amateurs and S.W.L.'s.
- Copy should be in block letters or typescript, signed and forwarded to The Editor, P.O. Box 150, Toorak, Vic., 3142.
- Excludes commercial advertising.
- Closing date for Hamads is the 3rd day of the month preceding publication.
- QTHR means the advertiser's name and address are correct in the current Australian Callbook.

FOR SALE

VK3ASC Quad, Triband — Castings with fibreglass spreader, assembled, as new $90.00. W. J. Bennett, VK3EJ, 4 Karralla Court, Lilydale. Ph. (03) 735 1350.

KEN, KP202 portable FM transceiver in new condition with 2 repeater and 4 simplex channels, $110.00; also new base station mic., dynamic, 200 ohms, cost $24.00, sell $14.00. Ring (03) 467 2131 bus. hrs.

Galbraith Noise Bridge, wired and going, $12.00. Ampress speech processor, as new, $30.00. VK3LC, QTHR. Ph. (03) 50-2556.

2 Mx FM Carphone, similar to A.R. model, but updated version, very neat construction with AWA escutcheon, dual gate Mosfet front end in Rx, Tx, Rx & xtal switching all on a single P.C.B., 6 channel capacity, Ch. 40 installed, Tx 25 watts, $125.00 O.N.O. Neil Osborne, VK3YEI. Ph. (03) 763-0256, **evenings** only.

MTR13, good cond., unconverted, $40.00. John Lancaster, VK3ZWL. Ph. (03) 62-0201, ext. 2486 (B.H.) or (03) 89-9017 (A.H.).

TCA1677 2 metre transceiver with instruction manual and mobile mount, fully converted and in good condition, with xtals for Ch. B, 4 and X. Best offer around $100 or swap with cash adjustment for good, general coverage, communications receiver. VK2BJK, QTHR. Ph. (02) 449 1598.

HW-7 QRP Transceiver, complete kit in unopened factory sealed package. Travelling overseas and will have no time to construct, $107. Ross Treloar, VK2BPZ, QTHR. Ph. (02) 259-5267 bus. hrs.

2m FM base and mobile units comprising AWA MR10 base with A.C. power supply, in-built speaker, and separate carbon P.T.T. mike both Rx and Tx separately switched; xtals for Ch. A, B and C. Pye Reporter with transistor power supply and xtals Ch C out Ch A in, with two cradles and circuit diagram. Recent satisfactory mobile contact with Orange repeater from Dubbo and Parkes. Some spare tubes including 2E26. Base station $50, mobile $35 or both $80 O.N.O. VK2AWY, Box 843, P.O., Orange 2800. Ph. (063) 62 1533 or A.H. 62 1807.

R5223 Receiver Modules, large quantity including the following: VFO, tuneable IF, IF Amp, Detector, AF Amp, xtal Cal Osc, set of one each, $30. Also front panels and complete dial mechanism assemblies, $30. 48 Milham Crescent, Forestville, N.S.W. 2087. Ph. (02) 888-2961 A.H.

Trio Rx 9R-59DS, 1.8-30 MHz coverage, AM/SSB/CW reception, 4 years old, AR mods, good condition, except for front panel slightly marred, $65; consider exchange for antenna rotator. Also No. 10 xtal cal., $15. VK3LJ, QTHR. Ph. (053) 32 3412 but during Jan try (03) 347 1729.

Yaesu FTDX560, mint condition, only 18 months old, $400 ONO. **6 meter Transverter**, 6/40 in final FET converter, $90 ONO. VK5AS, c/- P.O. Cowell, S.A. 5602.

WANTED

Band Spanner or similar mobile HF antenna required. Offers to VK4ZEZ, 35 Sycamore St., Pimlico, Townsville, 4810.

Coax Switch, two or more outlets. VK3LC, QTHR. Ph. (03) 50 2556.

Yaesu Type F, 5.1724 MHz sideband generator. David Farquharson, 29 Roberts Road, Belmont, Vic. Ph. (052) 43-2176 A.H.

2L Repeater Crystals for KP202. VK3BAX, QTHR. Ph. (052) 97401.

Ex R.A.A.F. RT-322/APG-30A and PP-2170/APG56 (modified unit), information on units wanted. Lionel Sharp, VK4NS, QTHR.

Silent Keys

JOHN WATSON	**VK6JW**
JOHN WALKER	**VK2GA**
BOB O'MAY	**VK7OM**
LEW SCOWN	**VK5YS**

It is with deep regret that we record the passing of Lew Scown, VK5YS. Operating from the Brahma Lodge area in the Salisbury district, Lew was an active amateur up to the end.

Always cheerful and bright despite two recent heart attacks, he carried on with his work where he was employed as a Technical Assistant at the Weapons Research Establishment, Salisbury and participated in the 2 metre net run nightly amongst his fellow hams after knock-off time at that establishment.

Lew died on the morning of Saturday, 26th October, aged 52 years after a major operation.

Whilst in hospital, Lew carried on with his amateur radio activity, having taken his 2 metre transceiver there with him so as to keep in touch with all his friends. He had not been operating on VHF for very long, but in the short period that he did operate on the net frequencies he became well known to many who had not heard him on the HF bands.

Lew's main interest in amateur radio was antennas, and he spent many hours working on same with a special emphasis on designing and testing miniature and loaded type arrays.

He worked on all the HF bands using both SSB and CW, and ran a number of skeds both with other VK5s and also interstate stations.

Lew held a licence for 20 years and in that time his hobby of radio was by far his major interest.

Lew leaves behind him his wife Thelma, two sons Lee and Dean, his daughter-in-law and one grandson. We extend our sincere sympathy to them in their loss.

He was a member of the 9th Division, A.I.F., and at the age of 18 years fought in the battle of El Alamein.

Lew will be remembered in high esteem by his many friends in the world of Amateur Radio.

Ian J. Hunt

FRANK W. NOLAN **VK2BNB**

Passed away peacefully early on 18th November, after a long illness. He was an old-timer from Queensland and until recently was still active on 14 MHz CW.

Mr. M. D. CLEGG **VK5ZEG**

Sadly missed by many amateurs and all his friends.

Two Antenna Rotators, one suitable for a VHF Yagi and the other suitable for an HF cubical quad or beam. Price and details to VK3ZR (ex VK3ZIP), 30 Mitchell Rd., Mont Albert N. 3128. Ph. (03) 89 4645 A.H.

Yaesu FV400 ext. VFO and FTV650 transverter. Particulars to VK3LP, QTHR, or Box 20, Castlemaine 3450. All replies answered.

Prop Pitch Motor. Price and particulars to VK5SW, QTHR. All replies answered.

SIDEBAND ELECTRONICS SALES and ENGINEERING

MERRY CHRISTMAS TO ALL!

YAESU MUSEN SEEMS TO HAVE CHANGED THEIR PRODUCTION PLANS AGAIN! PRESENTLY THE FT DX 401 WILL BE DISCONTINUED and THE PRODUCTION OF THE FT-FP 200 TAKEN UP AGAIN. THIS SHOULD PLEASE A LOT OF PEOPLE.

YAESU-MUSEN

FT 101 B AC-DC transceivers 8 weeks delay	$575
YC 355 D digital frequency counter still only	$250
Spectronics DD-1 digital counter for 101 / 401	$150
FT DX 400 / 560 noise blankers	$20
FT-FP 200 ex stock!	$420

TRIO-KENWOOD

TS 520 AC-DC with speaker	$550
External VFO for TS 520	$80

HY-GAIN ANTENNAS

14 AVQ 10-40 M vertical 19 feet tall no guys	$65
18 AVT / WB 10-80 M vertical 23 feet tall no guys	$90
TH3JR 10-15-20 M junior 3 el. Yagi	$135
TH3Mk3 10-15-20 M senior 3 el. Yagi soon	$180
TH6DXX 10-15-20 M senior 6 el. Yagi	$225
204BA 20 M monoband 4 el. full size Yagi	$190
Hy-Quad 10 / 15 / 20 M full size Cubical Quad	$200
Magnetic base mobile whip 108 MHz up with 18' RG-58U cable and coax plug	$18

CDR ANTENNA ROTATORS

AR-20, smallest model only for 2m beams	$40
AR-22R for stacked 2 & 6m or small HF beams	$50
Ham II with re-designed control box, now with separate brake-control	$150
All for 230V AC with indicator-control units.	
4-core cable for AR 20-22 p. yard	20 cents
8-core cable for HAM II heavy duty	60 cents
Light 12-core cable for HAM II	30 cents per yard

BARLOW-WADLEY RECEIVERS

Model XCR-30 Mk II 500 kHz to 31 MHz continuous coverage, crystal controlled reception of AM / USB / LSB / CW	$250

NOISE BRIDGES

Omega TE 01 up to 100MHz	$28

POWER OUTPUT METERS

Galaxy RF-550A with 6 pos. coax switch	$75

SWR METERS

Midland twin meter type, 52 ohms	$22

BALUNS

New Japanese model, 52 or 75 Ohm 1 KW PEP	$10

MOBILE ANTENNAS

MARK helicals 6 feet long	HW-40 for 40 M	$18
	HW-20 for 20 M	$16
	HW-80 for 80 M	$18
	high power KW-40 for 40 M	$25
	tri-band helical HW-3. 10 / 15 / 20 M	$25
ASAHI AS-303A 10-80 M set		$90
Swivel Base for MARK'S		$6

CUSH CRAFT ANTENNA PRODUCTS

DGPA 27-50 MHz ground plane	$25
AR-2 144 MHz Ringo	$20
LAC-2 lightning arrestors	$6

CRYSTAL FILTERS

9 MHz similar to the FT 200 ones. with carrier xtals	$35

POWER SUPPLIES

240 AC to 12V DC 3 to 3.5 Amps. regulated	$35

MIDLAND

PTT dynamic microphone	$10

27 MHz NOVICE LICENSEE & CITIZEN-BAND EQUIPMENT

MIDLAND 5 W AM 23-channel transceivers complete with PTT mike all channel crystals 12 V DC op. **$95**

MIDLAND 13-893 SSB-AM 23 channel 15 W PEP transceivers **$175**

SIDEBAND BRAND NC-310 one Watt hand-held transceivers **$50**; SE-501 SSB-AM 15 W PEP SSB 23-channel transceivers, complete with PPT mike, etc. 12V DC **$190**

144 MHz TWO METRE EQUIPMENT

MULTI-7 solid state 24 channel FM 12V DC transceivers, 1 and 10W output, receiver with FET rf stage and mixer, equipped with crystals for TEN Australian channels Nos. 40, 42, 44, 46, 48, 50, 54, 56, 58, 60, to be used either transceive or combinations repeaters and ANTI-repeaters, complete with PTT microphone, mounting bracket **$225**

KEN PRODUCTS KP-202 hand-held 2 W output transceivers, now with 4 Australian channels, 40 & 50 plus a choice of 2 repeaters 42-54, 44-56, 46-58, 48-60 **$150**; KCP-2 battery charger and 10 NICAD batteries **$35**; Leather case for KP-202 **$6**; Flexible helical whip for KP-202 **$6.50**; Extra crystals for KP-202 two crystals p. channel **$8.**

KLM ELECTRONICS solid state 12V DC 2 M. amplifier, 12 Watt output, automatic antenna change-over when driven, ideal for mobile use with the KEN KP-202 **$50**

All prices quoted are net, cash with orders, sales tax included in all cases, subject to changes without prior notice. No terms nor credit nor COD, only cash and carry, Government and Public Company orders no exceptions. Include 50 cents per $100 value for all-risk insurance, minimum insurance $0.50. Allow for freight, postage or carriage, excess will be promptly refunded. MARY & ARIE BLES, Proprietors.

SIDEBAND ELECTRONICS SALES and ENGINEERING

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